MASTER PLAN AND GENERAL MANAGEMENT PLAN

FOR

DISMAL SWAMP STATE NATURAL AREA

Department of Environment, Health, and Natural Resources

Division of Parks and Recreation

July, 1995

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EXECUTIVE SUMMARY

ESTABLISHMENT OF THE DISMAL SWAMP STATE NATURAL AREA

The Dismal Swamp is the largest remaining swamp in the eastern United States. About 106,000 acres are protected by the United States Fish and Wildlife Service (USFWS) in the National Wildlife Refuge System. In 1974, the state of North Carolina purchased 14,344 acres from The Nature Conservancy for $2.2 million to establish Dismal Swamp State Park. In the late 1980's, the Division of Parks and Recreation (DPR) changed the area's classification to a state natural area because of its natural significance, limited potential for public use,and lack of funds to develop educational and recreational resources.

NATURAL RESOURCES

The Dismal Swamp State Natural Area is a vast, forested wetland containing four noteworthy natural communities: Nonriverine Swamp Forest, Pond Pine Woodland, Peatland Atlantic White Cedar Forest, and High Pocosin. The plant communities historically present in the Dismal Swamp were changed over 200 years ago when the area was drained and timbered. The ditches and roads that were constructed have altered the natural hydrology and, as a result, made conditions less favorable to cypress and cedar forests. The natural fire regime has also been affected by the ditches, roads, and fire suppression. As a result, hardwoods have invaded the pocosins and cedar forests. The swamp supports a large variety of migratory neotropical birds, mammals (including the Dismal Swamp southeastern shrew, black bear, and bobcat), reptiles, and amphibians. It also supports a significant butterfly fauna.

Peatland Atlantic White Cedar Forest

This forest is one of three well-defined natural communities at Dismal Swamp State Natural Area, covering approximately 6 percent of the site (about 890 acres). This natural community consists solely of Atlantic white cedar (*Chamaecyparis thyoides*) in the canopy, although red maples are invading some stands and reaching the canopy in places.

PARK PURPOSES

Dismal Swamp was authorized as a state natural area so that its valuable biological, geological, scenic, and recreational values could be protected. The Division of Parks and Recreation is charged with preserving these values and providing park experiences that promote pride in and understanding of North Carolina's natural heritage.

In addition to protecting the natural resources described above, the park provides an excellent opportunity for visitors to experience an extensive east coast swamp and pocosin complex. Activities that promote the park's interpretation and education goals should be emphasized. The extensive road system can support long-distance hiking and bicycling. Because of the soil types present, only limited visitor facilities are feasible. The most significant scenic resources are the Atlantic white cedar stands and the extensive swamp and forested areas. Although present trails are located exclusively on straight road beds, they provide opportunities to view wildlife.

RELEVANT LAWS AND AGREEMENTS

Land and Water Conservation Fund Stipulations

The area was purchased with a federal Land and Water Conservation Fund grant from the Secretary of Interior's contingency reserve. The land acquisition project was approved because it sought to preserve a unique natural resource (a portion of the Great Dismal Swamp) and it was of broad significance (the swamp is the largest swamp on the Atlantic coast). The grant states that the area is to ". . . *be retained as a natural preserve with only minimal future development to promote the preservation and interpretive theme.*" Actions that would convert the area to other uses must be approved by the National Park Service. Land converted to other uses, such as logging, must be replaced with land of equal value and usefulness.

Current Park Management

The USFWS manages the state's land from the Great Dismal Swamp National Wildlife Refuge according to a Memorandum of Understanding (MOU) that is in effect until September 30, 1997. The stipulations include:

- The USFWS manages forest, wildlife, and water resources.
- The Dismal Swamp State Natural Area continues to be a unit of the state parks system.
- The land is subject to all state park rules and statutes.
- Public access can be limited (only hiking and bicycling are currently allowed).
- The state must approve any construction.
- The state parks system is responsible for fire detection and suppression, under a MOU with the N.C. Division of Forest Resources. In the event of a fire on state park property, the Division of Forest Resources will assume direction for the control of any wildfire either in or threatening state parks as quickly as possible after discovery.

MANAGEMENT ISSUES

Natural Resource Issues

Hydrology - Before canals were dug into the Great Dismal Swamp, drainage of the swamp was very poorly defined, with no obvious river or creeks. Many canals are now located throughout the Dismal Swamp. The extensive canal system has contributed to a loss of wet-soil species because the soils are considerably drier than they were 200 years ago. These drier soils favor trees such as red maple, tuliptree, and sweetgum at the expense of bald-cypress and the tupelos. The USFWS staff are attempting to determine the swamp's historic hydroperiod - the time that the wet soils occurred each year without the canals - and more closely mimic those conditions today.

Prescribed Burns - In areas dominated by white cedar, wildfires burned the vegetation, killing the cedar trees; these fires also burned the upper layer of peat, however, allowing cedar seeds stored in the ground to germinate, often producing pure stands. Additional research and experience will be needed before instituting a widespread burn program within the state natural area.

Park Management Issues

Which Agency Should Manage the Site? The state of North Carolina should continue the MOU with the USFWS until sufficient state park system staffing, equipment, and administrative/visitor facilities are available. The Division should provide adequate staff, equipment, and funds so that Dismal Swamp can be operated as a state natural area in a manner consistent with the mission of North Carolina State Parks System. When sufficient state resources are available, Dismal Swamp State Natural Area should be managed as a state parks system unit.

Maintaining Fire Lines for Fire Suppression: The USFWS has the heavy equipment and trained operators needed to maintain the roads on both state and federal property. These dirt roads serve as fire breaks as well as vehicle routes through the park. For transportation purposes, the roads should be maintained in proportion to their purpose and use. Because private vehicles are not allowed, the existing mowing regime provides sufficient passage for federal and state staff patrols. The USFWS mows the following roads each spring to keep them accessible: Corapeake (from the western park boundary to Laurel), Forest Line, and Kim Saunders.

Fire suppression efforts are not hindered by the current mowing schedule. Fires in swamp areas tend to burn slowly and provide greater reaction time. Fire fighters using road maintenance equipment can clear the vegetation from dirt roads when a fire occurs. Maintaining fire breaks by regular mowing is only one factor affecting fire suppression. Because the USFWS has sophisticated weather tracking capabilities at the National Wildlife Refuge (including the ability to detect lightning strikes), early detection of fires in the Dismal Swamp is expected.

The Division should maintain the existing mowing schedule in cooperation with the USFWS. This schedule should be reexamined when the Division receives sufficient funding to establish the Dismal Swamp State Natural Area as a unit of the state parks system.

PUBLIC HEARING RESULTS

The Division of Parks and Recreation conducted a public hearing on September 19, 1994 in Elizabeth City to obtain comments concerning the Dismal Swamp State Natural Area. After Division staff presented an introduction and explained the meeting's purpose, attendees were asked to respond to the question, "What are your suggestions for the future of Dismal Swamp State Park?"

Public Hearing Suggestions

1. Bring education and interpretation/stewardship/conservation together. (18 votes)
2. Need cooperative effort with N.C. Division of Forest Resources: Education/management/use. (13 votes)
3. Update development plans with US Fish & Wildlife Service to avoid duplication of facilities, programs, personnel, etc. (10 votes)
4. Establish some facilities to encourage eco-tourism, especially near US 17 welcome/visitor center. (5 votes)
5. Restore natural hydrology. (4 votes)

5. State pay back federal government and turn over to N.C. Forest Service. (4 votes)
6. Allow more public access from the south. (3 votes)
6. Determine LWCF requirements for conservation purposes and compare to current management. (3 votes)
6. State should manage park (Forest Resources if not Parks & Recreation). (3 votes)
6. Use park resources to generate some funding for the park in cooperation with Forest Resources. (3 votes)
7. Need boating access along canal for small boats. (2 votes)
8. Coordinate signs/information with park development. (1 vote)
8. Develop environmental education materials, programs, etc. (1 vote)

SITE LIMITATIONS

Soils - The soils at the Dismal Swamp State Natural Area are peat and muck,which severely limit any type of construction or road building. Federal regulations prohibit filling in wetlands. These soil conditions make it nearly impossible to locate buildings or new roads within the current park boundaries.

Access - The state of North Carolina does not own road access to the Dismal Swamp State Natural Area. Although Division staff members are permitted to enter the park through the federal refuge, this route is closed to public vehicular traffic. To the east, the site is separated from U.S. 17 by the Dismal Swamp Canal and, according to U.S. Army Corps of Engineers regulations, no structure may be constructed across the canal that will impede boat traffic. Private land abuts the southern-most boundary.

MASTER PLAN

The master plan identifies land acquisition boundaries needed to protect the site's natural resources, describes the physical plant needed to accommodate public use, and describes the major interpretive themes. The original master plan for Dismal Swamp, written in 1974, has been reviewed to determine if changes are needed. Factors considered include: the park purpose statement, relevant laws and policies, natural heritage inventory, park management considerations, public opinion expressed through public involvement efforts, and park visitor safety. The review resulted in this revised master plan, which replaces the 1974 plan. The master plan's primary objectives are to obtain legal access to the state's property, to provide interpretation and education programs and facilities, and to manage the area's natural resources according to the DPR natural resource policy.

The master plan construction includes a visitor center on the east bank of the Dismal Swamp Canal as well as trails, group campsites, and maintenance facilities on the west bank (Figure 1). The visitor center is a multi-use building containing the reception area, exhibit area, auditorium, office space, access road, parking lot, storage space, exhibits, furniture, and equipment. It will be located on U.S. 17, just south of the Dismal Swamp Canal Visitor Center and Welcome Center. Ferry service will take visitors across the Dismal Swamp Canal to the swamp. Ferry service will comply with the federal regulation prohibiting structures that impede boat traffic on the canal or infringe on the width of the canal.

The facilities on the west bank include a maintenance area, ranger residence, primitive camps, trail improvements, and an interpretive trail boardwalk with an overlook area. Primitive group camps will be provided for groups who wish to spend several days in the park. Groups interested in the Atlantic white cedar stands will find these campsites particularly useful because the travel time between the visitor center and cedar stands invites overnight stays. Specific sites should be located where impacts to the park's natural resources will be minimized.

The maintenance area will require land acquisition on the southeast corner of the park where the soils will support building construction. An access road will be needed to connect S.R. 1221 which parallels the Dismal Swamp Canal and the southeast corner of the state's property. This option is the best way to reach the eastern edge of the park, where most of the visitor use will occur.

All the facilities described in the master plan should be completed at one time. The park should not open to the public until sufficient staffing, equipment, and administrative/visitor facilities are available. Minimal staffing and equipment will result in inadequate stewardship of the natural resources and will hamper essential visitor services.

The master plan does not recommend converting the Dismal Swamp State Natural Area to state forest for multiple-use management that would include logging. The federal LWCF grant to purchase the property states that the area is to ". . . *be retained as a natural preserve with only minimal future development to promote the preservation and interpretive theme.*" Actions that would convert the area to other uses must be approved by the National Park Service. Land converted to other uses, such as timber production, must be replaced with land of equal value and usefulness.

LAND ACQUISITION NEEDS

The state parks system's highest land acquisition priority at Dismal Swamp is to obtain legal access to the state natural area. Acquiring approximately 49 acres between S.R. 1219 to Bull Boulevard along the southern border will provide access to the western side of the state's land. If this land cannot be acquired, another way to gain access to the western side of the state natural area is to acquire access rights along Insurance Ditch Road to Bull Boulevard.

The maintenance and operations center will require about 120 acres adjacent to the southeast corner of the state natural area. The maintenance center will located about 7,000 feet north of the end of S.R. 1221 and, therefore, approximately 25 acres will be needed for a 150-foot-wide right-of-way. Finally, approximately 201 acres may be sold to the USFWS so that hunters on the National Wildlife Refuge lands to the north of the state natural area will not need to cross state natural area land to access refuge lands. Land purchases and sales will result in a net decrease of two acres for the Dismal Swamp State Natural Area.

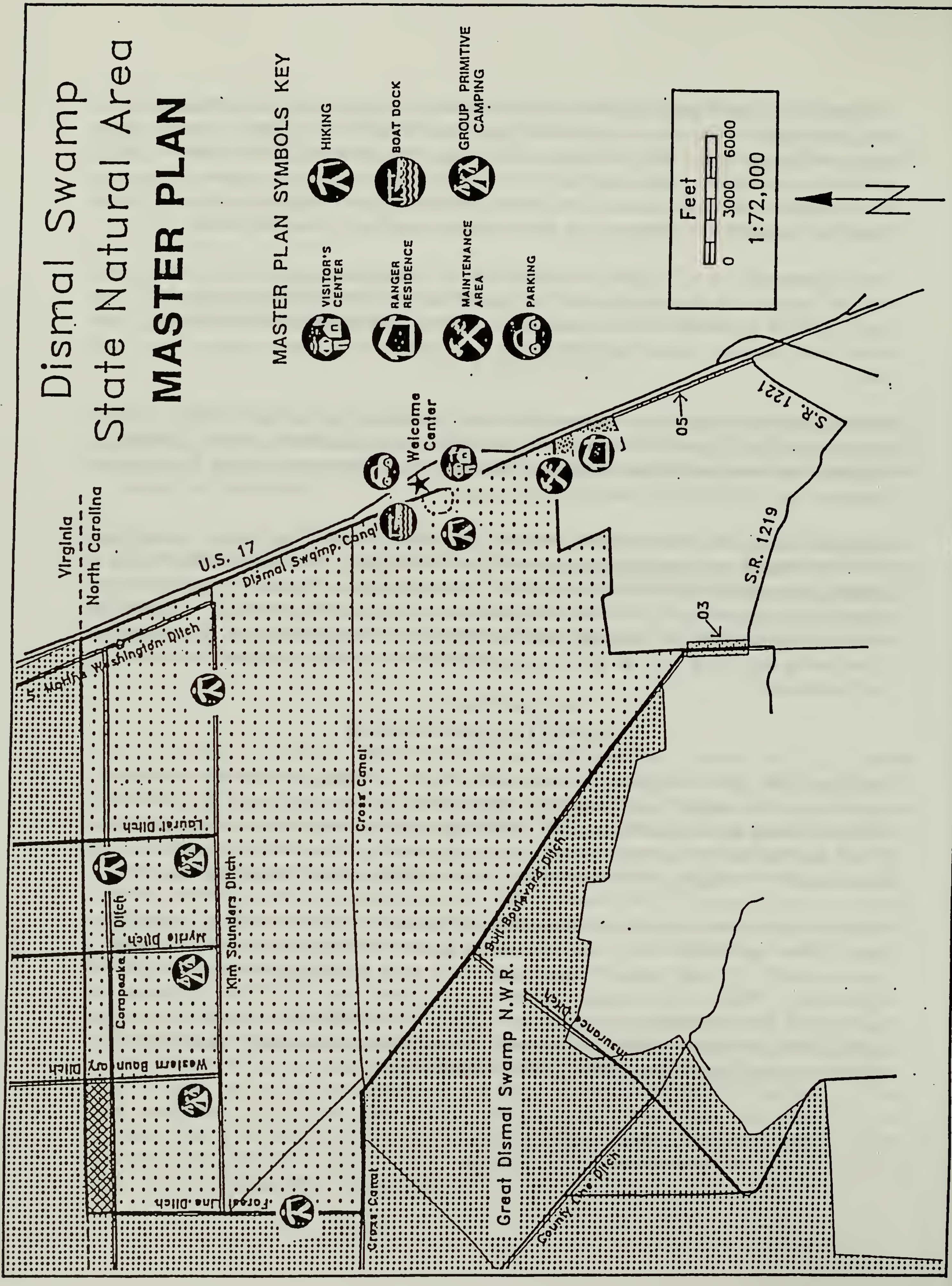
Dismal Swamp
State Natural Area
MASTER PLAN
MASTER PLAN SYMBOLS KEY
VISITOR'S CENTER
HIKING
RANGER RESIDENCE
BOAT DOCK
MAINTENANCE AREA
GROUP PRIMITIVE CAMPING
PARKING
Feet
0 3000 6000
1:72,000
N
Virginia
North Carolina
U.S. 17
Dismal Swamp Canal
Welcome Center
05
03
S.R. 1221
S.R. 1219
Martha Washington Ditch
Laurel Ditch
Myrtle Ditch
Corapeake Ditch
Kim Saunders Ditch
Western Boundary Ditch
Forest Line Ditch
Cross Canal
Bull Boundary Ditch
Great Dismal Swamp N.W.R.
Insurance Ditch
County Line Ditch

Figure I

INTRODUCTION

The 1993 General Assembly passed legislation requiring that the Dismal Swamp master plan be updated. The legislation stipulates that public participation, including a public hearing, be a part of that process. It also requires the fire lines in the park to be maintained for fire suppression purposes.

Planning is an essential component of effective and efficient park administration and management. The North Carolina General Assembly acknowledged its importance by passing state parks system legislation that includes planning requirements. The 1987 State Parks Act (G.S.114-44.7 through 114-44.14) stipulates that a State Parks System Plan be prepared. The plan is to evaluate the statewide significance of parks, identify duplications and deficiencies in the system, describe the resources of the system, propose solutions to problems, describe anticipated trends, and recommend means and methods of accommodating trends.

The State Parks Act also requires each park to have an individual general management plan. The GMP is required to:

> *...include a statement of purpose for the park based upon its relationship to the System Plan and its classification. An analysis of the major resources and facilities on hand to achieve those purposes shall be completed along with a statement of management direction. The general management plan shall be revised as necessary to comply with the System Plan and to achieve the purpose of the [State Parks Act].*

A GMP is to be a comprehensive five-year plan of management for a park unit. GMP's function to:

1. describe park resources and facilities;
2. state the purpose and importance of each park unit;
3. outline interpretive themes and propose locations for informational and interpretive facilities;
4. analyze park and recreation demands and trends in the park's service area;
5. summarize the primary laws guiding park operations;
6. identify internal and external threats to park natural and cultural resources, and propose appropriate responses;
7. identify and set priorities for capital improvement needs;
8. analyze visitor services and propose efficient, effective, and appropriate means of responding to visitor needs; and
9. review park operations and identify actions to support efficient and effective park administrative procedures.

This document contains the updated master plan and the general management plan for Dismal Swamp State Natural Area. These plans, developed with public involvement, serve these purposes.

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OVERVIEW

I. LOCATION AND HISTORY

LOCATION

The Dismal Swamp State Natural Area (SNA) is located in Camden County in northeast North Carolina. The site's northern boundary is the Virginia state line, which also serves as the boundary of the Great Dismal Swamp National Wildlife Refuge. The refuge also borders Dismal Swamp SNA on the west and southwest. Private farm land abuts the southern boundary. The eastern boundary is the Great Dismal Swamp Canal and U.S. Route 17 (Figure I-1).

LAND BASE

The Dismal Swamp is one of the few remaining large wetlands areas in the eastern United States. The Dismal Swamp SNA contains 14,344 acres, and the adjoining Great Dismal Swamp National Wildlife Refuge contains more than 106,000 acres (Figure I-2). The area is very flat, and the soils are almost entirely peat of various depths.

The state natural area is traversed by an extensive ditch and canal system that was used to drain the area when it was being timbered. Corapeake Ditch, Kim Saunders Ditch, and Cross Canal Ditch are oriented in an east-west direction. Bull Boulevard is a ditch that defines the state natural area's southwestern boundary. Western Boundary, Myrtle, and Laurel ditches are oriented north-south.

FORMATION OF THE SWAMP

The basic hydrologic requirements for the formation and development of large peat swamps are a humid climate with reasonably uniform rainfall throughout the year and restricted drainage, both surface and subsurface. The Dismal Swamp has a warm humid climate, an average annual rainfall of 45 to 50 inches, and an average annual temperature of 59° to 60° F. Average monthly rainfall ranges from 3.20 inches in October to 6.73 inches in July. Average monthly temperature ranges from 41.2° F. in January to 78.8° in July.

The thick, rather impervious clay of the Yorktown Formation, which underlies the entire area, is an effective seal preventing either downward or upward movement of water. The pre-peat surface is fairly flat. Surface drainage is restricted by the sharp rise of the Suffolk scarp on the west and by the Fentress Rise on the east. To the north, the flat surface of the Churchland Flat inhibits flow.

The general hydrologic conditions necessary for the formation of a swamp existed in the Dismal Swamp area before peat began to form. Studies show that the peat began to form in topographic lows along the stream channels. This, plus the fact that the stream channels had formed, indicates that there was no area-wide ponding in the Dismal Swamp when the peat began to form.

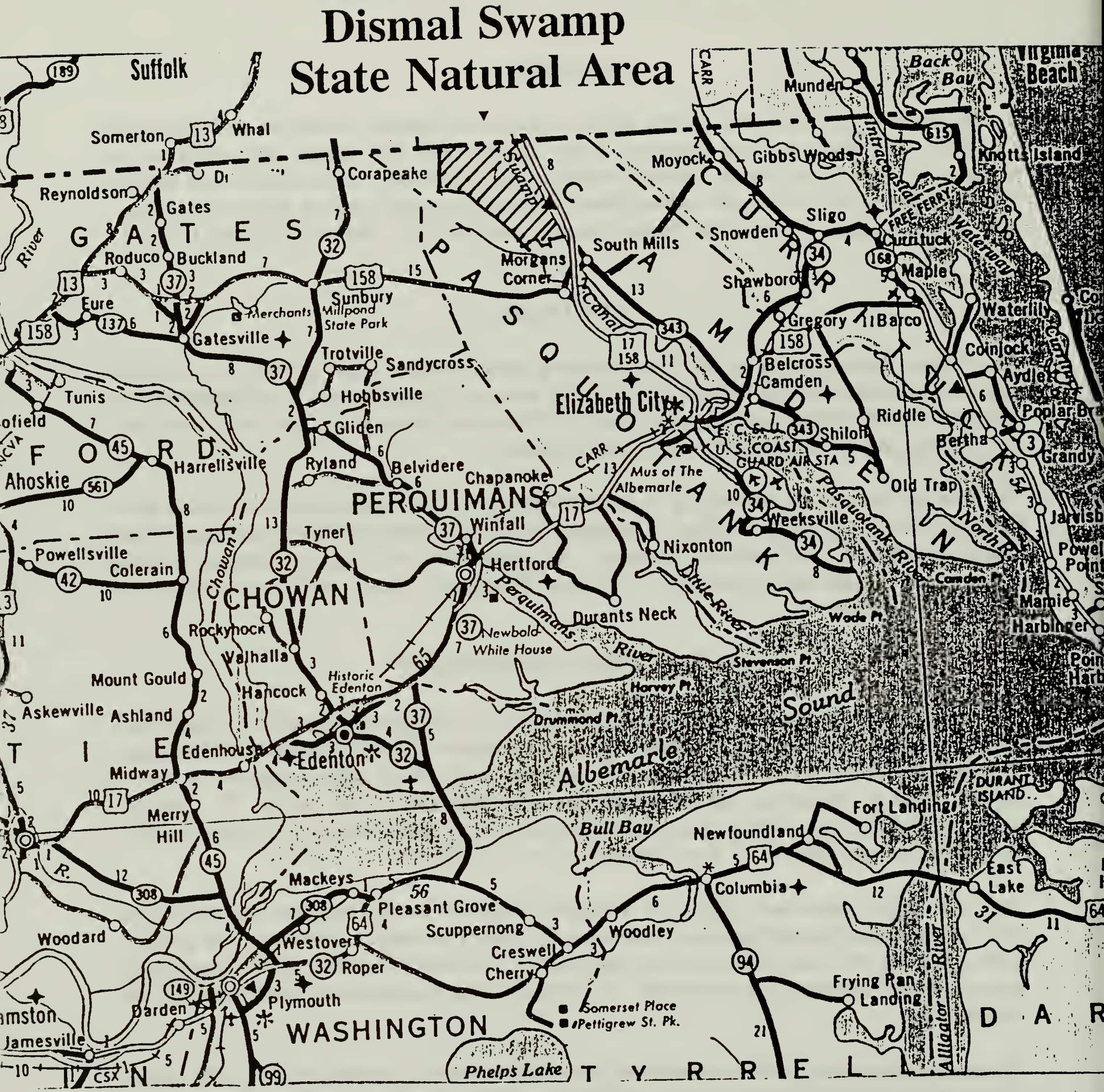


Figure I-1. Location Map.

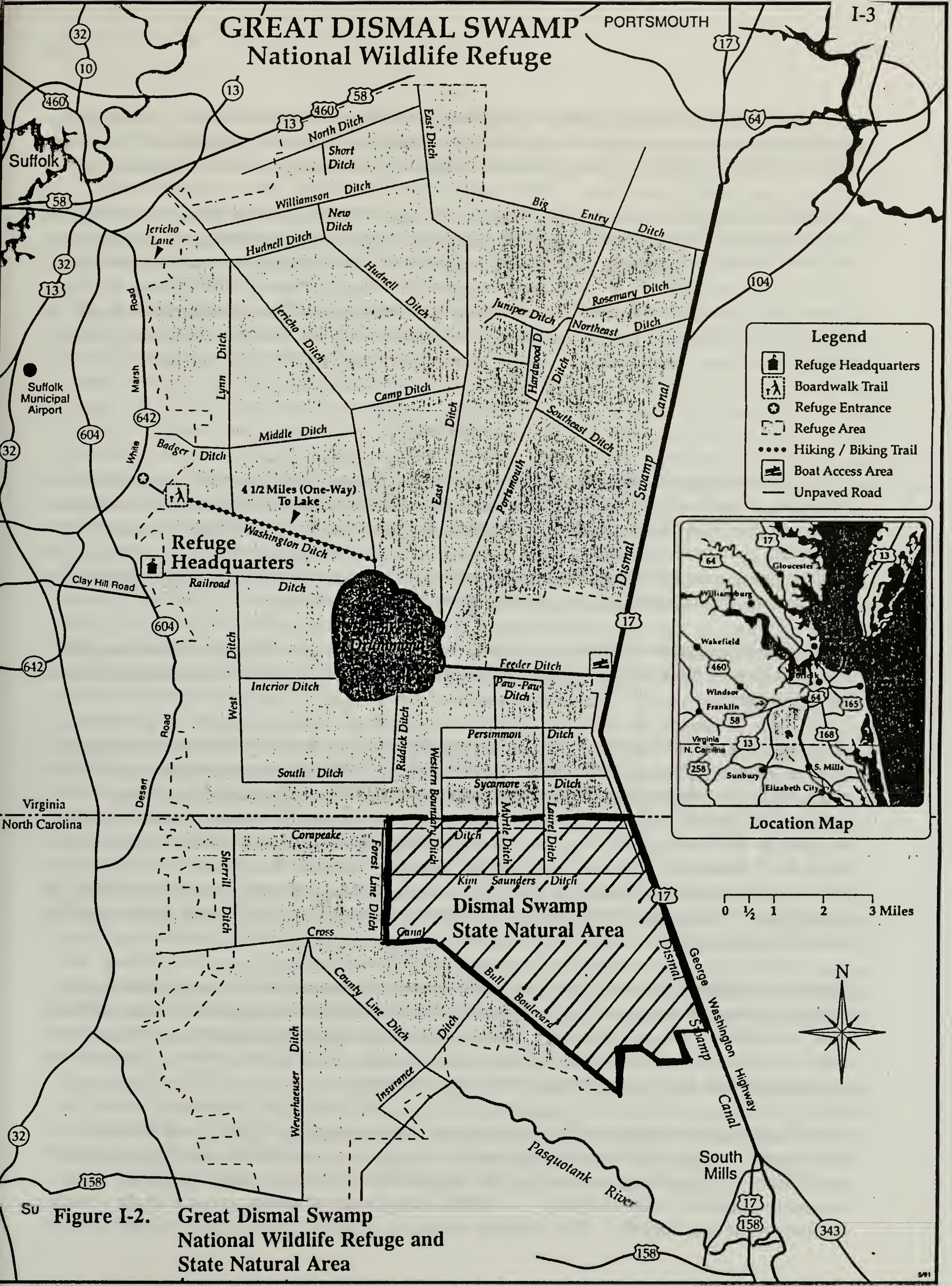


Figure I-2. Great Dismal Swamp National Wildlife Refuge and State Natural Area

As downcutting of the broad shallow valleys of the drainage system proceeded, the silty clay-confining layer was removed, thereby allowing upwelling of water. The addition of this water in an area of poor surface drainage may have been sufficient to trigger the accumulation of peat.

The ground water, although a small percentage of the total water budget of the area, would be especially significant because it would be a relatively constant quantity and would keep the area wet even during dry periods. Once started, the formation of peat would be self-perpetuating. As the peat accumulated, it would tend to block the stream channels, slow surface drainage, cause local ponding, and hold the upwelling ground water. The ground water would be distributed by artesian pressure and by capillary action, and the area of peat would gradually spread.

HISTORY

With its abundance of fish and wildlife, the Dismal Swamp area was well known to Native Americans as a much-coveted hunting ground long before European settlement of the east coast. At the time of the first European settlement in Virginia (1607), the Dismal Swamp area was controlled by the Warroscoyack Tribe, a member of the Powhatan Federation. Although the Native Americans maintained hunting lodges around the perimeter of the area, there is no evidence that they established any permanent villages in the swamp.

When European settlement came, the swamp was a natural barrier to the normal movement and transportation of the colonists. Thus it influenced the social and economic development of the immediate area.

With timber a valuable export item and a necessity for local development, the colonists were soon nibbling at the edges of the swamp, cutting trees. Although some may have explored the entire area, few left written records. One who did was William Drummond, the first governor (1663-67) of North Carolina. He is generally credited with being the first white man to discover the lake in the center of the swamp, now called Lake Drummond. In 1728 Colonel William Byrd II of Westover, Virginia, surveyed the boundary between the colonies of Virginia and North Carolina, which cut through part of the swamp, and he was one of the first to record his experiences. He was not impressed with the area, referring to it as a "dismal place" (thus the name Dismal Swamp).

Despite his dislike of the area, Byrd recognized its possible commercial and agricultural values. Noting evidence of timber cutting on the borders of the swamp, he suggested draining the whole area by ditching. He also noted the possible *"advantage of making a channel to transport by water-carriage goods from Albemarle Sound into Nansemond and Elizabeth River,"* thus making him probably the first to suggest the possibility of a canal.

In 1763 George Washington visited the area (and later surveyed much of it) and was struck by the natural beauty of the swamp and lake. He was also impressed with the commercial possibilities of the timber resources. He applied for a charter, and in 1764 the Virginia Assembly granted it to his company "*...to drain a large tract of marshy grounds in the counties of Nansemond and Norfolk.*" This company eventually acquired approximately 40,000 acres of timberland in the swamp believed to contain "*the finest cypress, juniper, and other lofty wood.*" To facilitate the harvesting and removal of the timber, the company dug many ditches and several canals. The first canal, now called the Washington Ditch, was probably dug in the late 1760's, although the first reference to it is not until 1772. It was about 5 miles long and 12 feet wide and ran west from the edge of Lake Drummond. Although the Washington Ditch has been redug and its character changed in recent times, it was one of the first canals built by the colonists and may possibly be the oldest, still-usable canal in the country.

The first formal proposal to construct a ship canal was made to the Virginia Assembly in 1784, with the support of Governor Patrick Henry. The Dismal Swamp Canal was to be a "ship" canal, rather than what was called a "commercial" canal. The ship canal could take almost any kind of vessel, the only limitation being the width and depth of the channel and the size of the locks. In 1793, slave labor was used to commence digging at both ends, south from Deep Creek, Virginia, and north from Joyce Creek or Old Lebanon (now South Mills), North Carolina, the two places approximately 22 miles apart. The legislation authorizing the construction of the canal also authorized the construction of a stage coach road parallel to the canal. By 1804 this road was passable on foot and horse, and by 1805 a stage coach toll route was established. (The present U.S. 17 route generally follows this old stage coach road.)

The colonists depended upon the wood products from the forest. Wood was cheap, easy to obtain, and easy to work. They needed wooden buckets to hold water, measure grains, store foods and pack items for shipment. They used baskets woven from bark in countless ways on the plantation. Their furniture was made of wood, as were the wooden tubs used for doing laundry, watering animals, pickling foods, and many other purposes. Most of their homes were covered with shingles, and the sides of many houses were covered with wooden clapboards. The framework of buildings was made from hewed beams; barrels and hogsheads were standard containers in handling the tobacco crop; juniper and cypress made the very finest charcoal, used in making gunpowder; hardwoods such as beech were used as a source of alkali for making soap and removing the hair from hides in the tanning industry; tar, turpentine and pitch from the pines were in great demand throughout the world in ship building; and saw timber was needed for wagons, fences, and general building purposes.

The Dismal Swamp Canal's "golden age" was generally considered to be from 1839 to 1860. Hundreds of shingle flatboats, picturesque passenger ships, and freighters plied its length. This had a great effect on the Dismal Swamp, as more and more timber was cut and shipped out via the canal and the numerous ditches cut for the purpose. And as the canal became better known and more popular, so did the Dismal Swamp. The canal and ditches made virtually every area of the swamp accessible, not only to the lumberman, hunter, and trapper, but also to the tourists who came to see the swamp, and, particularly, Lake Drummond.

Beginning in 1859, a period of decline set in for the Dismal Swamp Canal with the completion of the rival Albemarle and Chesapeake Canal over an easier route, and a little later the outbreak of the Civil War. The Confederate forces controlled the canal until April 1862 when the battle of Camden, North Carolina, was fought about three miles below South Mills at Turner's Cut. After that it was used by the Union forces, but maintenance was neglected.

The use of the canal increased towards the end of the century after navigation methods had improved. A good passenger service developed between Norfolk and Elizabeth City until 1881, when the Elizabeth City - Norfolk Railroad began service. Because of the improvements and changes that had been made to the Dismal Swamp Canal, however, its use for hauling freight managed to surpass that of the Albemarle and Chesapeake Canal for a while. Schooners were loaded to the gunwhales with farm products of the trucking section around the Carolina Sounds, and barges carried lumber for eventual sale in the northern markets of Philadelphia and New York.

This temporary advantage was short-lived, however. In 1911, after a series of surveys, the United States government purchased the Albemarle-Chesapeake Canal, making it part of the federally maintained system later known as the Intracoastal Waterway. This toll-free canal operating parallel to the Dismal Swamp Canal would destroy most local commerce.

But the canal remained open because the Richmond Cedar Works, with extensive lumbering rights in the Dismal Swamp, shipped some lumber on the canal. At the same time, the internal combustion engine had been perfected, and more power yachts and cruisers began to use the canal as the means of going south in the fall and north again in the spring. The Dismal Swamp Canal route had one decided advantage over the Albemarle-Chesapeake: Elizabeth City was a comfortable day's run from Norfolk. Yachts could get supplies in Elizabeth City and lie over for the night before proceeding on down the line.

During the early 1960's, new canals were dug on the property along the Corapeake Road. The spoils were used to construct logging roads, thus opening much of North Carolina's land to the logging operations of Atlantic Farms, Georgia-Pacific, and Weyerhaeuser. Bull Boulevard, Forest Line, Boundary, Saunders and Myrtle roads became part of a system designed to open new areas for timber-cutting operations in Virginia as well as North Carolina. Georgia-Pacific harvested timber along the Dismal Swamp Canal, Atlantic Farms clear-cut white cedar west of Forest Line Road, and property owned by Julian Headley was selectively cut for pine.

Virtually the whole swamp has been cut over at least once, although a few tracts of virgin timber may remain here and there. The first trees to go were the tall junipers - Atlantic white cedar - which were cut for lumber, shingles, barrels, casks, and tubs. The big black gum and water gum trees were taken along with the juniper in the early days of Dismal Swamp logging. Later, the pines and some hardwoods were cut for sawtimber. For many years, the timber companies in the Swamp used narrow-gauge railroads to haul out the logs.

Even more damaging than the logging was the drainage of the swamp by ditches and canals for agricultural drainage, log floating, navigation, log roads, fire roads, and firebreaks. As the drying out of the swamp increased the fire hazard, more canals were dug as firebreaks and to provide the spoil for construction of fire as well as logging roads. This practice appears to be in direct conflict with earlier decisions concerning ownership of the water rights in the swamp. This conflict dates back to the 1890's when the issue went to court. In its decision, the court cited the sections of the Legislative Charter vesting the water rights of the region in the proprietors of the canal, the same rights vested to the current owners.

The judge remarked that 95 years of acquiescence by all parties concerned had established their individual rights beyond the point of argument. The Court further stated that, "*It shall not be lawful for any person whatsoever to cut off or divert the course of those waters which flow from the westward into the lake, so as to prevent their continuing to fall into it.*" It is clear that the legislature, as well as the court, exerted every care to assure the canal company the exclusive rights to all the waters entering the swamp, including those that flow across its surface and the artesian sources that enter the region through underground channels.

On March 30, 1929, "*The canal and all appurtenances thereto. . . including the rights, privileges and franchises as vested in the original canal company were purchased by the United States Government. The canal was incorporated into the Intracoastal Waterway; made toll free, and assigned to the Army Corps of Engineers for operation. . .*"; thus making "*. . . the United States Government the sole agency vested with authority to originate action that will protect and preserve the water rights, as well as the valuable assets of the Swamp.*"

Since then, the Corps has completely modernized the canal, making it 9 feet deep and 50 feet wide. The two remaining locks at Deep Creek, Virginia, and South Mills, North Carolina, were replaced with modern structures, and new highway bridges and spillways were constructed, so that today none of the original structures associated with the canal survive, and the canal itself bears little resemblance to the original. Over 100 miles of ditches have been constructed in the swamp, with the soil being used for roads. Many of these ditches have water control-gates, while other ditches permit the water to escape in very short periods after rains.

The state of North Carolina proposed to acquire a portion of the Dismal Swamp area for inclusion in the state park system. The 1971 session of the General Assembly passed an act appropriating funds for "*. . . purchasing such lands as are necessary to acquire the Dismal Swamp and enough surrounding land to establish a State Park at the Dismal Swamp in Camden County. . .*" (Chapter 1035, House Bill 749, July 21, 1971). To assist in the proposal, the Nature Conservancy purchased 14,343.5 acres in North Carolina at a cost of $2.2 million. Repurchase of the property by North Carolina was completed in early 1974.

Just prior to adjournment in 1972, the 92nd Congress passed, and President Nixon signed into law, a bill directing the Secretary of the Interior to undertake a year-long study of the "*. . . feasibility and desirability of preserving and protecting the Dismal Swamp Canal, Lake Drummond, and the Dismal Swamp.*"

In February of 1973, Union Camp Corporation donated 49,000 acres in the Great Dismal Swamp to the U.S. Department of the Interior through The Nature Conservancy. The land, now totaling about 106,000 acres, is currently being managed for preservation by the United States Fish and Wildlife Service in the National Wildlife Refuge System. The Secretary of the Interior declared this property to be a National Natural Landmark and has included it in the National Registry of Natural Landmarks. Under criteria established by the Secretary of the Interior's Advisory Board on National Parks, Historic Sites, Buildings, and Monuments, however, the existing structures and canal do not possess national historical significance; therefore, they would not qualify for admission as a historic unit to the National Park System. The Historic Preservation Act of 1966 would afford protection if the canal were placed on the National Register of Historic Places.

In the spring of 1973, the Department of the Interior published its study recommendations for preserving the Dismal Swamp. Studies indicated that the "primary area" of the Dismal Swamp, about 123,000 acres, should be preserved by public agencies. Likewise, public policy regarding use of the water draining into the Dismal Swamp Canal should be re-evaluated in order to preserve the present ecological conditions. Of special mention was the need to manage the timber and manipulate water within the "primary area" of the Great Dismal Swamp. Water and timber management are definitely required to maintain the diversity of plant and animal life within the area and to arrest the encroachment of red maple and other upland tree species.

A controlled day-use program for the public was envisioned for the interior of the Swamp, with camping and support services to be provided around the perimeter of the "primary area." Environmental education, research, nature interpretation, and wildlife-oriented recreation would be stressed. The plan further recommended that the state of North Carolina develop hiking, canoeing, and interpretive trails on its 14,000+ acre site to coordinate with those provided by the National Wildlife Refuge. Also, the study recommended camping and environmental education facilities on the site.

In 1974, the state of North Carolina purchased 14,344 acres from The Nature Conservancy for $2.2 million. In 1976, the Division of Parks and Recreation hired a park ranger for the Dismal Swamp State Park, who began managing the area according to the master plan by developing trails and primitive campsites. He opened the park to the public by escorting park visitors across the federal refuge land using Corapeake Road. In 1978, the ranger was replaced by a part-time park attendant after local requests to relax hunting regulations in the park were denied, and the park was closed to the public. In the late 1980's, the Division changed Dismal Swamp State Park to a state natural area because North Carolina does not own a public access and because the site has severe limitations for development. Today the U.S. Fish and Wildlife Service manages the state's land from the Great Dismal Swamp National Wildlife Refuge according to a Memorandum of Understanding that is in effect until September 30, 1997. A summary of the MOU is provided in Chapter II.

II. SUMMARY OF LAWS GUIDING PARK MANAGEMENT

There are many federal and state statutes, state and federal executive orders, and administrative rules and policies that govern the operation of the state parks system. This chapter includes a brief discussion of the primary legal basis for the existence and operation of the state parks system. It also includes other legal issues of particular concern at Dismal Swamp State Natural Area.

STATE LEGAL MANDATES

The North Carolina Constitution

Article XIV, Section 5 of the North Carolina Constitution sets overall policy by broadly defining the conservation and protection of natural resources and the acquisition of such resources as a proper function of government.

> *It shall be the policy of this State to conserve and protect its lands and waters for the benefit of all its citizenry, and to this end it shall be a proper function of the State of North Carolina and its political subdivision to acquire and preserve park, recreation, and scenic areas, to control and limit the pollution of our air and water, to control excessive noise, and in every other appropriate way to preserve as a part of the common heritage of this state its forests, wetlands, estuaries, beaches, historical sites, open land, and places of beauty.*

The State Parks Act

The State Parks Act (G.S. 113-44.7 through 113-44.14) sets forth a mission statement for the state parks system. It states that the system functions to preserve and manage representative examples of significant biological, geological, scenic, archaeological, and recreational resources, and that park lands are to be used by the people of the state and their visitors and descendants in order to promote understanding of and pride in the state's natural heritage.

The State Parks Act also calls for development and periodic revisions of a System Plan to achieve the mission and purpose of the state parks system in a reasonable, timely, and cost-efficient manner. The Act describes System Plan components and requires that public participation be a component of plan development and revisions.

The State Parks Act also calls for the classification of park resources and development of general management plans (GMPs) for each park. GMPs are to include a statement of park purpose, an analysis of major resources and facilities, and a statement of management direction.

Powers and Duties of the Department of Environment, Health, and Natural Resources

This act authorizes the Department to investigate the resources of the state and to take such measures as it may deem best suited to promote the conservation and development of such resources. The Act also authorizes the Department to care for state forests, state parks, and other recreational areas now owned, or to be acquired by, the state. (G.S. 113-8)

State Nature and Historic Preserve Dedication Act

The State Nature and Historic Preserve Dedication Act (G.S. 143-260.6) was authorized by Article 14, Section 5 of the North Carolina Constitution. It seeks to ensure that lands and waters acquired and preserved for park, recreational and scenic areas for the purpose of controlling and limiting the pollution of air and water, controlling excessive noise, and in every other appropriate way preserving as a part of the common heritage of the state, continue to be used for those purposes. The State Nature and Historic Preserve therefore provides a strong legal tool for protecting lands from incompatible uses.

The addition and removal of lands to and from the State Nature and Historic Preserve require a law enacted by a vote of three-fifths of the members of each house of the General Assembly.

As of April 4, 1989, 14,344 acres of Dismal Swamp State Natural Area were in the State Nature and Historic Preserve.

North Carolina Environmental Policy Act of 1971

Recognizing the profound influence that man's activity has on the natural environment, the General Assembly passed the Environmental Policy Act ". . . *to assure that an environment of high quality will be maintained for the health and well-being of all. . .*"

The Act declares that:

> *It shall be the continuing policy of the State of North Carolina to conserve and protect its natural resources and to create and maintain conditions under which man and nature can exist in productive harmony. Further, it shall be the policy of the State to seek, for all its citizens safe, healthful, productive, and aesthetically pleasing surroundings; to attain the widest possible range of beneficial uses of the environment without degradation, risk to health or safety; and to preserve the important historic and cultural elements of our common inheritance. (G.S. 113A-3)*

While there are other General Statutes that concern the state parks system and the environment, the above-described statutes, along with Article XIV, Section 5, of the North Carolina Constitution, largely define the purposes of the state parks system and serve to guide the operation of state park system units.

FEDERAL LAWS

Land and Water Conservation Fund Act of 1965

The federal Land and Water Conservation Fund Act (PL 88-578) offers protection and places restrictions on fund-assisted outdoor recreational areas.

Dismal Swamp SNA was purchased in 1974 through the Land and Water Conservation Fund (LWCF). The grant's purpose was the acquisition of approximately 14,000 acres of land in the Great Dismal Swamp for use as a new state park. Due to the unique ecology of the area, the project was to retain the area as a natural preserve, with only minimal future development, and to promote the preservation and interpretive theme. The land acquired was unimproved and consists primarily of swamp forest, pond pine woodland, and Atlantic white cedar, all part of the Great Dismal Swamp. The National Park Service determined that limited outdoor recreational use appropriate to the resource was both feasible and desirable, but that development should be minimal in order to protect the ecology of the area. The national significance of the Great Dismal was recognized in its establishment as a National Wildlife Refuge, a major portion of which (43,200 acres) has been designated a National Natural Landmark.

By virtue of receiving LWCF grant assistance, all of Dismal Swamp State Natural Area is subject to LWCF rules and regulations. Property acquired or developed in whole or in part with LWCF assistance cannot be converted to other than public outdoor recreational use without federal approval. A conversion may take place only if approved by the Secretary of the Interior, and only then if replacement property of equal fair market value and reasonably equivalent usefulness and location is made.

LWCF requirements include: programming, operating and maintaining areas in a manner that encourages public participation; maintaining the property so it appears attractive and inviting to the public; maintaining property, facilities, and equipment to provide for public safety; keeping facilities, roads, trails, and other improvements in reasonable repair throughout their lifetime to prevent undue deterioration and encourage public use; keeping the park and facilities open for use at reasonable hours and times; and making future development meet LWCF rules and regulations. LWCF-assisted sites are periodically inspected by state and federal inspectors to ensure compliance with LWCF requirements.

The Clean Water Act

The Dismal Swamp has extensive wetland areas. These sensitive areas receive protection from Section 404 of the federal Clean Water Act. The Act prohibits the discharge of dredge or fill materials into waters, including wetlands, without a permit from the U.S. Corps of Engineers. Activities in wetlands for which permits may be required include, but are not limited to: placement of fill material; ditching activities when excavated material is side cast; land clearing involving relocation of soil material; land leveling; most road construction; and dam construction. The Division will avoid construction in wetlands unless there is no practical alternative and all practical measures are taken to minimize harm to the wetland.

The Americans With Disabilities Act

Title II of the ADA prohibits discrimination against any "*qualified individual with a disability.*"

New Construction and Alterations

> *Buildings that are constructed or altered by, on behalf of, or for the use of a public entity shall be designed, constructed, or altered to be readily accessible to and usable by individuals with disabilities.*
>
> (Section 35.151 of Title II)

Existing Facilities

> *Structural changes in existing facilities are required only when there is no other feasible way to make the public entity's program accessible.*
>
> ("Structural changes" include all physical changes to a facility [28 CFR Part 35, Section 35.150, Title II of the ADA Section-by-Section Analysis].)

When alterations affect access to a primary function of a facility, the entity shall also make alterations to the path of travel to the area and bathrooms, public telephones, and drinking fountains serving the altered area.

Programs and Services

> *...each service, program, or activity conducted by a public entity, when viewed in its entirety, be readily accessible to and usable by individuals with disabilities.*
>
> (Title II, Section 35.150)

This includes, but is not limited to, the provision of auxiliary aids and services, including services and devices for effective communication where necessary to afford persons with disabilities an equal opportunity to participate in and enjoy the benefits of a service, program, or activity conducted by a public entity.

Signs

A public entity must ensure that persons with impaired vision and hearing can obtain information regarding the location of accessible services, activities, and facilities. Signs must be provided at all inaccessible entrances to each facility directing users to an accessible entrance or to a location where information can be obtained about accessible facilities. The international symbol for accessibility must be used at each accessible entrance to a facility. (Title II, Section 35.163)

MEMORANDA OF UNDERSTANDING

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service manages the state's land from its office at the Great Dismal Swamp National Wildlife Refuge. A Memorandum of Understanding has the following stipulations.

- The U.S. Fish and Wildlife Service manages forest, wildlife, and water resources.
- The Dismal Swamp State Natural Area continues to be a unit of the state parks system.
- The land is subject to all state park rules and statutes.
- Public access can be limited (only hiking and bicycling are currently allowed).
- The state must approve any construction.
- The state parks system is responsible for fire detection and suppression, in cooperation with the N.C. Division of Forest Resources.
- The agreement is effective until September 30, 1997.

N.C. Division of Forest Resources

The N.C. Division of Parks and Recreation and the N.C. Division of Forest Resources have a Cooperative Forest Fire Control Agreement. The agreement stipulates that district foresters will notify the park superintendent of any fires in or threatening a state park. In the event of a fire on state park property, the Division of Forest Resources will assume direction for the control of any wildfire either in or threatening state parks as quickly as possible after discovery.

III. PARK AND RECREATION DEMAND AND TRENDS

POPULATION TRENDS

The area surrounding the Dismal Swamp State Natural Area consists of five counties: Camden, Currituck, Gates, Pasquotank, and Perquimanns. The total population in the area was 70,690 in 1990, an 11 percent increase over the 1980 population of 63,741. During the next 10 years, the population is predicted to grow by an estimated 10 percent to 77,836, an increase of 7,146 people. The population increase will occur primarily in Currituck and Pasquotank counties. The population density in the area is among the lowest in the state; four counties had densities of 52 people or less per square mile in 1990. Only Pasquotank County, at 137 people per square mile, is near the state average of 136.06 people per square mile. Because of the relatively low population of the surrounding area, a greater portion of park visitors will come from more distant areas. Nearby Merchants Millpond State Park attracts visitors from the Raleigh-Durham-Chapel Hill metropolitan area as well as the Norfolk-Virginia Beach metropolitan area.

ATTENDANCE PROJECTIONS

Attendance at the Dismal Swamp State Natural Area should come from three main sources: the surrounding area, the Raleigh and Virginia Beach metropolitan areas, and travelers along U.S. 17. The park will attract school groups interested in environmental studies as well as hikers and other people interested in the swamp environment. Attendance during the spring and fall should be as high if not higher than the summer season. Not only will school groups use the area more heavily during the spring and fall, but the general public is more likely to visit during the cooler seasons.

Dismal Swamp State Natural Area should benefit from its proximity to Merchants Millpond State Park in attracting visitors from outside the area because Merchants Millpond is frequently visited by residents of the Raleigh and Virginia Beach areas. Regular visitors to Merchants Millpond (85,041 visits in 1994) are likely to also to be interested in the Dismal Swamp because it's also an extensive natural area.

Many visitors at Dismal Swamp State Natural Area will be travelers using U.S. 17 and the Dismal Swamp Canal. Future visitation at the state natural area can be estimated by reviewing traffic counts along U.S. 17, the canal, and the current visitation at the Dismal Swamp Canal Welcome Center/Visitor Center. U.S. 17 is a major north-south travel corridor in eastern Virginia and North Carolina. The average daily traffic count on U.S. 17 near the welcome center is 6,900 vehicles. In 1994, 1,266 boats - all classified as recreational craft — used the Dismal Swamp Canal. Annual visitation at the welcome center, which serves both highway and canal travelers, is approximately 500,000 people. Although most travelers will stop briefly, people on a more leisurely schedule may choose to visit the park's exhibit space or to hike a self-guided trail.

PUBLIC SUGGESTIONS ABOUT THE DISMAL SWAMP STATE NATURAL AREA

During the master plan revision, the Division received suggestions for the future of Dismal Swamp State Natural Area. Most respondents support an expanded role for the state of North Carolina at the Dismal Swamp. This includes opening the area to the public as well as providing visitor facilities and services while maintaining stewardship of the natural resources. These facilities should be located on U.S. 17, the region's major travel corridor, to encourage eco-tourism. These plans should be coordinated with the US Fish & Wildlife Service to avoid duplication of facilities, programs, and personnel.

Other respondents support a cooperative effort with the N.C. Division of Forestry in expanding the state's role at the Dismal Swamp. This approach encourages identifying area that have less natural significance and creating a multiple-use state forest that would combine timber production and public use. The timber production would generate a portion of the operating funds for the state forest. Because the site was purchased with and LWCF grant, any alternative that includes timbering will require replacing these area with land of equal value and usefulness.

OUTDOOR RECREATION PARTICIPATION IN NORTH CAROLINA

The five most popular outdoor recreational activities in North Carolina are walking for pleasure, driving for pleasure, viewing scenery, beach activities, and visiting historical sites. Three out of every four households participated in walking for pleasure at least once in the past 12 months (Table III-1). In addition to the five most popular activities, over 50 percent of the households responding to a 1989 survey participated at least once in the following activities: swimming (in lakes, rivers, or oceans), visiting natural areas, picnicking, attending sports events, visiting zoos, and freshwater fishing.

The North Carolina Outdoor Recreation Participation Survey was mailed to 3,100 randomly selected residents in the spring of 1989. Forty-five percent, or 1,399 people, returned completed surveys. Each person receiving the survey was asked to estimate the number of times the members of his household had participated in each of 43 activities. The survey results provide good insight into the current participation of North Carolinians in a wide range of outdoor recreation activities.

Table III-1. Outdoor recreation activities ranked by popularity.

Rank	Activity	Percentage of Households Participating
1.	Walking for Pleasure	75%
2.	Driving for Pleasure	72
3.	Viewing Scenery	71
4.	Beach Activities	69
5.	Visiting Historical Sites	62
6.	Swimming (in Lakes, Rivers, and Oceans)	54
7.	Visiting Natural Areas	53
8.	Picnicking	52
9.	Attending Sports Events	52
10.	Visiting Zoos	51

PRIORITIES OF PUBLIC OUTDOOR RECREATION FUNDING

The North Carolina Outdoor Recreation Survey asked residents a series of questions to identify and rank future demand for various types of public outdoor recreation activities. Future demand was determined by asking them which activities they would have tried more often had adequate facilities been available. Respondents were then asked to rank these activities in order of importance.

In the second part of the analysis, the respondents' level of support for publicly funded outdoor recreation activities was determined by asking them to identify and rank those activities to which government should give highest priority when spending public money. The same scoring system used to analyze unmet demand was then applied to the survey results, with each activity receiving a high, moderate, or low rating in public support for public funding.

In the final part of the needs analysis, the two ratings for each activity were combined to produce a score of one to nine that reflected both future demand and public funding priorities. The activities that ranked high in both future demand and support for public funding received the highest priority in the needs assessment. Support for public funding was given higher priority than expressed demand (Table III-2). Several activities rated as the highest priorities are activities that are currently or could potentially be provided at the Dismal Swamp State Natural Area. The activities include visiting natural areas, viewing scenery, and trail hiking.

Table III-2. Priorities for Future Outdoor Recreation Activities

Activity	Code	Future Demand	Support for Public Funding
Walking for Pleasure	1	High	High
Camping, Tent or Vehicle	1	High	High
Picnicking	1	High	High
Beach Activities	1	High	High
Fishing - Freshwater	1	High	High
Attend Outdoor Cultural Events	1	High	High
Visiting Natural Areas	2	High	Moderate
Use of Play Equipment	2	High	Moderate
Visiting Zoos	2	High	Moderate
Visiting Historical Sites	2	High	Moderate
Bicycling for Pleasure	3	Moderate	High
Swimming (in Pools)	3	Moderate	High
Viewing Scenery	4	Moderate	Moderate
Hunting	4	Moderate	Moderate
Trail Hiking	4	Moderate	Moderate
Use of Open Areas	4	Moderate	Moderate
Target Shooting	4	Moderate	Moderate
Swimming (Lakes, Rivers, Ocean)	4	Moderate	Moderate
Fishing - Saltwater	4	Moderate	Moderate

VISITOR INFORMATION

In 1987 the U.S.D.A. Forest Service was contracted by the Department to conduct a Park Areas Recreation Visitors Survey (PARVS) of the North Carolina state parks system visitors in order to identify their socio-economic characteristics and economic contribution to the state's economy. While Dismal Swamp was not one of the eight parks involved in the survey, some information concerning state park visitors in general was learned.

Why do people visit state park units? The convenient location was cited by 31 percent of the respondents; 25 percent thought other areas were too crowded; 21 percent liked the good facilities; 8 percent wanted to try a new area; 7 percent enjoyed the scenic beauty; and 6 percent came to see the attraction.

Over one third (37 percent) of park visitors come from within a 30-mile radius, while 17 percent come from 30 to 60 miles away. Park visitors surveyed indicated that the parks served as their sole destination 86 percent of the time. While most visitors come from nearby, the average one-way distance travelled was 139 miles. Seventy-eight percent of those surveyed indicated that they were return visitors. The average number of return trips per year was six. Sixty-one percent of visitors statewide came with family members, 16 percent with friends, and 7 percent with family and friends. Ten percent of visitors came alone. Visitors also came in small numbers in organized groups and multiple families. The average group size surveyed was 3.59.

PARVS data indicate that 16.8 percent of groups surveyed used more than one car, and that the average number of persons per car was 3.05. The average age of the park visitor was 38.24 years. The age distribution was as follows:

Percent of Visitors by Age Group

Under 6	6-12	13-18	19-25	26-35	36-45	46-55	56-65	Over 65
6.7	11.6	10.6	12.5	20.1	16.9	0.9	7.3	4.4

Because the PARVS information shown above was gathered at eight park sites, not including Dismal Swamp State Natural Area, it cannot be considered a valid study of Dismal Swamp visitation. It is useful, however, in providing a general assessment of the state park system's visitation as well as a general indication of likely visitation at Dismal Swamp.

PARVS data indicated that approximately 25 percent of state park visitation comes from out of state. PARVS data also indicated that out-of-state visitors averaged 4.1 trips per year to North Carolina state parks.

MANAGEMENT IMPLICATIONS OF DEMOGRAPHIC AND SOCIOECONOMIC TRENDS

Explained below are the management implications of trends identified in the *Systemwide Plan for the State Parks System* that are relevant to Dismal Swamp State Natural Area.

- Families constitute 60 percent of the groups visiting the state parks system, according to the 1986 PARVS survey. Population projections predict the birth rate will continue to increase through the end of the century. As these new families demand recreation and park opportunities, the system should experience increased demand for children's programs and facilities. The proposed visitor center with exhibits, classroom space, and additional interpretive staff will help meet this need.

  Developing interpretative centers and environmental education programs to accommodate this increased population of children will be important if we are to instill an environmental ethic in the new generation. The proposed visitor center will portray the park's interpretative themes if exhibits and educational equipment are funded.

- The state parks system should experience a continued demand for high quality back country recreation. These activities are threatened by greater visitation, encroaching development, and environmental degradation. The primitive areas within the park should continue to provide high-quality opportunities for hiking and other primitive recreational opportunities. Primitive group camping is recommended for groups interested in the Atlantic white cedar forest.

PARK PURPOSE STATEMENT

IV. PARK PURPOSES

STATE PARKS SYSTEM MISSION STATEMENT

The North Carolina state parks system exists for the enjoyment, education, health, and inspiration of all our citizens and visitors. The mission of the state parks system is to conserve and protect representative examples of the natural beauty, ecological features, and recreational resources of statewide significance; to provide outdoor recreational opportunities in a safe and healthy environment; and to provide environmental education opportunities that promote stewardship of the state's natural heritage.

DISMAL SWAMP STATE NATURAL AREA PURPOSE STATEMENT

November 16, 1994

North Carolina purchased Dismal Swamp State Park in 1974 from The Nature Conservancy using a federal Land and Water Conservation Fund (LWCF) matching grant. The U.S. Department of the Interior funded the grant from the Secretary's contingency reserve based on specific criteria. The land acquisition project was approved because it sought to preserve a unique natural resource (a portion of the Great Dismal Swamp) and it was of broad significance (the swamp was the largest swamp on the Atlantic coast). The grant states that the park is to ". . . *be retained as a natural preserve with only minimal future development to promote the preservation and interpretive theme.*" In the late 1980's, the park unit's designation was changed from state park to state natural area because of the lack of funding for the proposed public access and visitor facilities.

Dismal Swamp State Natural Area is a vast, forested wetland containing four noteworthy natural communities: Nonriverine Swamp Forest, Pond Pine Woodland, Peatland Atlantic White Cedar Forest, and High Pocosin. The plant communities historically present in the Dismal Swamp were changed over 200 years ago when the area was drained and timbered. The ditches and roads that were constructed have altered the natural hydrology and, as a result, made conditions less favorable to cypress and cedar forests. The natural fire regime has also been affected by the ditches, roads, and fire suppression. As a result, hardwoods have invaded the pocosins and cedar forests. The Dismal Swamp's natural hydrology should be restored and fire management should be implemented in order to recreate these natural processes. The swamp supports a large variety of migratory neotropical birds, mammals (including the Dismal Swamp southeastern shrew, black bear, and bobcat), reptiles, and amphibians. It also supports a significant butterfly fauna.

The significant geological resource is the swamp, which was formed by gradual peat deposition on a fairly flat, poorly drained surface. The area is bounded by the Suffolk Scarp to the west and by the Fentress Rise to the east. Underlying much of the swamp is the Yorktown formation, an impermeable clay that acts as an effective barrier against upward or downward water movement. Although the state natural area and the adjacent National Wildlife Refuge protect 120,000 acres of the Great Dismal Swamp, at least half the original acreage has been drained.

Significant archaeological resources have not been discovered. The Dismal Swamp is thought to have been a prime hunting and fishing area for Native American tribes prior to European settlement. Although hunting lodges were maintained around the perimeter of the swamp, no evidence exists that any permanent villages were established in the swamp. The area has a rich cultural history. William Drummond, first governor of North Carolina, explored the area, and George Washington helped sponsor the digging of the first ditch. Virginia Governor Patrick Henry proposed the Great Dismal Swamp Canal, which has been listed on the National Register of Historic Places.

The park provides an excellent opportunity to experience an extensive east coast swamp and pocosin complex. Activities that promote the park's interpretation and education goals should be emphasized. The extensive road system can support long-distance hiking and bicycling. Because of the soil types present, only limited visitor facilities are possible.

The most significant scenic resources are the Atlantic white cedar stands and the extensive swamp and forested areas. Although present trails are located exclusively on straight road beds, they provide opportunities to view wildlife. Additional opportunities to view the swamp would be possible if trails were constructed off the ditches.

Dismal Swamp was authorized as a state natural area so that its valuable biological, geological, scenic, and recreational values could be protected. The Division of Parks and Recreation is charged with preserving these values and providing park experiences that promote pride in and understanding of North Carolina's natural heritage.

PARK DESCRIPTION AND EVALUATION

V. NATURAL RESOURCE MANAGEMENT

NATURAL RESOURCE MANAGEMENT POLICY

The Division of Parks and Recreation's approach to natural resource management is directed by the North Carolina Constitution and the State Parks Act, both of which require the prudent management of natural resources. The constitution sets the overall policy by broadly defining the conservation and protection of natural resources and the acquisition of such resources as a proper function of government. The State Parks Act states that unique archaeological, geological, biological, scenic, and recreational resources are a part of the heritage of the people that *"...should be preserved and managed by those people for their use and for the use of their visitors and descendants."*

The North Carolina state parks system plays an important role in maintaining, rehabilitating, and perpetuating the state's natural heritage. The natural resources of the state parks system are: high quality, rare, or representative examples of natural communities; native plants and animals; geological features and landforms; water resources; and the natural processes that affect these resources. The primary objective in natural resource management will be the protection of natural resources for their inherent integrity and for appropriate types of enjoyment while ensuring their availability for future generations.

It is the Division's policy that natural resources will be managed by allowing natural environments to evolve through natural processes with minimal human influence. Natural resource management will not attempt solely to preserve individual species or processes; rather, it will attempt to maintain all the components and processes of a park's naturally evolving ecosystems. When intervention is necessary, direct or secondary effects on park resources will be minimized to the greatest extent possible. Intervention of natural processes may occur:

1) to correct or compensate for the previous disruption of natural processes by humans;
2) to protect, restore, or enhance rare species;
3) to protect, restore, or enhance significant archaeological resources;
4) to construct, maintain, improve, or protect park facilities; and
5) to prevent danger to human health or safety.

All park facilities will be designed, constructed, and maintained to avoid adverse impacts to high quality natural communities, rare plant and animal species, major archaeological sites, and other natural and cultural resources.

NATURAL COMMUNITIES

A natural community is defined as ". . . *a distinct and reoccurring assemblage of populations of plants, animals, bacteria, and fungi naturally associated with each other and their physical environment.*" The descriptions of the communities that have been described for Dismal Swamp State Natural Area follow the *Classification of the Natural Communities of North Carolina: Third Approximation* (Schafale and Weakley, 1990).

Nonriverine Swamp Forest

Nonriverine Swamp forest is the dominant natural community present at Dismal Swamp State Natural Area. Approximately 55 percent (roughly 7,885 acres) of the state natural area is considered to support this community type. Nearly all of the area south of Cross Canal is Nonriverine Swamp Forest, and scattered portions in the northern half of the site support this community type. This community is composed of several subtypes, based on canopy trees and type of shrub layer. Four subtypes are present in the natural area: maple/pocosin shrubs, maple/cane, mixed hardwoods, and tupelo.

Maple/pocosin shrubs — This subtype is quite common in the natural area and features red maple (*Acer rubrum*) as the dominant canopy species. Average canopy height is estimated to be 65 to 70 feet. A scattering of other trees may be present, such as tuliptree (*Liriodendron tulipifera*), sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus teada*), or Atlantic white cedar (*Chamaecyparis thyoides*). The subcanopy is usually sparse, and an observer can often see for hundreds of yards beneath the maple canopy. The shrub layer is generally very dense and contains species typical of pocosins. Common shrubs or small trees include inkberry (*Ilex glabra*), shining fetterbush (*Lyonia lucida*), redbay (*Persea borbonia*), sweet pepperbush (*Clethra alnifolia*), and highbush blueberry (*Vaccinium corymbosum*). Vines such as laurel-leaf greenbriar (*Smilax laurifolia*) are often common as well. The herb layer is generally sparse because of the dense shading. A scattering of ferns is often present. This subtype can be seen at many places along the northern half of Bull Boulevard Ditch and scattered along Kim Saunders Ditch and Corapeake Ditch.

Maple/cane — This subtype is less common than the maple/pocosin shrubs subtype. The canopy is almost completely dominated by red maple, with a scattering of other trees, such as those in the previous subtype. The average canopy height is estimated to be 65 to 70 feet. The subcanopy is very sparse, and few shrubs other than cane are present. The shrub layer consists of a very dense stand of cane, often 6 or more feet tall. Other woody plants present include American holly (*Ilex opaca*), redbay, sweet pepperbush, and tall pawpaw. The reason cane grows where it does is not readily apparent. The soil might be somewhat more mineral in composition than the sites where cane is absent. It is not likely that the cane areas are simply sites that were burned or cleared more recently than those with dense pocosin shrubs. This subtype is found mainly in the extreme southern part of the site, near Bull Boulevard Ditch. Cane is infrequently seen from Kim Saunders Ditch or Corapeake Ditch.

Mixed hardwoods — This subtype occurs where red maple and tupelo comprise less than 50 percent of the canopy. The average canopy height for this subtype is 65 to 70 feet. Other hardwoods that typically dominate the canopy are sweetgum and tuliptree. These species are found in somewhat richer soils. Tall pawpaw is often found where these trees grow. Either tuliptree or sweetgum may dominate the canopy or be mixed with varying amounts of red maple. Other canopy trees that may occur are loblolly pine, Atlantic white cedar, and water oak (*Quercus nigra*).

As with the other subtypes, the subcanopy is somewhat sparse. Typical small trees include tall pawpaw, redbay, sweetbay (*Magnolia virginiana*), and American holly. Cane is infrequent in these forests. The shrub layer may be as thick as that under some red maple forests, but it is usually slightly less dense and somewhat more diverse; sweet pepperbush is generally the most common shrub. This subtype features fewer of the evergreen "pocosin-type" shrubs (such as inkberry and shining fetterbush) and more deciduous shrubs, such as Virginia-willow (*Itea virginica*), swamp fetterbush (*Leucothoe racemosa*), and wild azalea (*Rhododendron periclymenoides*). Because the shrub layer is normally not quite as dense as that found elsewhere in the state natural area, the herb layer is more diverse in this subtype; many species of ferns dominate the herb layer. This subtype is found exclusively in the southern half of the natural area. The southern half of Bull Boulevard Ditch has good examples, and additional stands are found west of Dismal Swamp Canal, south of Cross Canal.

Tupelo — This subtype is rare in the state natural area, and it is becoming more threatened by invasion of other hardwoods. This is a senescent vegetation type in that it was once more common in the state natural area, but drainage by canals and ditches has hampered regeneration of swamp tupelo (*Nyssa biflora*) and bald-cypress (*Taxodium distichum*) to the benefit of red maple, tuliptree, and sweetgum. This subtype consists of forests dominated by swamp tupelo, with a scattering of bald-cypress and other trees, especially red maple. The canopy trees are often 80 feet tall and 2 to 3 feet in diameter, making this the most mature vegetation type in the state natural area. The subcanopy is moderate to fairly dense; red maple may be quite common. The small tree and shrub layers contain redbay, sweetbay, coastal doghobble (*Leucothoe axillaris*), southern wild raisin (*Viburnum nudum*), and many other species.

Some areas under the tupelos are dominated by cane, to the exclusion of most other species. Many species of ferns are present; netted chainfern (*Woodwardia areolata*) and Virginia chainfern (*W. virginica*) are abundant. Other common herbs include false nettle (*Boehmeria cylindrica*) and lizard's-tail (*Sauruus cernuus*). Vines may be also numerous, with species uncommon in the natural area, such as climbing hydrangea (*Decumaria barbara*), found. Little standing water is present, however, allowing red maple and other hardwoods to increase at the expense of tupelo and cypress. This subtype is limited mainly to the southeastern corner of the area, just west of Dismal Swamp Canal. The southeastern portion of the natural area, extending nearly a mile west of Dismal Swamp Canal, features a splendid old-growth stand of swamp tupelo and other hardwood trees, with many trees having trunk diameters of 2 to 3 feet. Only a handful of bald-cypress trees are present. Red maples and tuliptrees are invading this forest type. Unfortunately, there appears to be no reproduction of tupelo or cypress.

Pond Pine Woodland

This natural community contains a dominance of pond pine (*Pinus serotina*) in the canopy. Approximately 35 percent (about 5,570 acres) of the state natural area is composed of this community, mostly in the northeastern portion. The pines average 60 feet tall in many areas. In some places, the canopy is nearly 100 percent pine; but red maple is invading this community such that, even where the canopy is essentially all pine, the maples are common in the subcanopy and will reach the canopy in one to several decades. In this community there are essentially no other canopy trees, but a few loblolly pines or Atlantic white cedars may be seen. Other than maples, the subcanopy is sparse, but the small tree/shrub zone is always extremely dense and nearly impenetrable. Inkberry is, by far, the most common shrub. Other shrubs include gallberry (*Ilex coriacea*), shining fetterbush, redbay, sweet pepperbush, and highbush blueberry. Vines, especially laurel-leaf greenbriar, are abundant. Herbs are very scarce.

This natural community is in decline at Dismal Swamp State Natural Area and is threatened by red maple invasion. The many ditches and canals and the long fire suppression of the area have created favorable conditions for moderately rapid invasion of maples. The eastern halves of Kim Saunders Ditch and Corapeake Ditch contain good examples of the Pond Pine Woodland community.

Peatland Atlantic White Cedar Forest

Peatland Atlantic White Cedar Forest is the least extensive of the three well-defined natural communities at Dismal Swamp State Natural Area, covering approximately 6 percent (about 890 acres). This natural community consists solely of Atlantic white cedar (*Chamaecyparis thyoides*) in the canopy, although red maples are invading some stands and reaching the canopy in places. The average height of the cedars is estimated at 50 to 55 feet and diameters at one foot. Few cedars are taller than 60 feet, even though they appear to be fully mature. Depending on the density of the cedars, subcanopy and shrub layers are highly variable. In dense stands, relatively little else grows in the cedar stands, and only the many fallen trunks and limbs of the cedars are present on the ground. Red maple is present in the subcanopy of many stands, however, to the eventual detriment of the cedars. Less dense stands have a thick small tree/shrub zone. Common woody plants include redbay, sweet pepperbush, inkberry, gallberry, and many other species. Herbs are generally scarce in white cedar stands. This community is limited to the northwestern portion of the natural area, primarily along Forest Line Ditch; other stands visible from roads are found along the western portions of Corapeake and Kim Saunders ditches and near the junction of Cross Canal and Bull Boulevard Ditch.

High Pocosin

High pocosin is a rare natural community today at Dismal Swamp. Twenty or more years ago, this was a more common vegetation type, occupying perhaps 10 percent of the natural area along the northwestern border. Continued fire suppression and ditching have seemingly converted this community into Pond Pine Woodland and Nonriverine Swamp Forest communities. There is a question whether this was ever a najturally recurring community at Dismal Swamp, because cutting of cedar stands, or catastrophic fires, could possibly lead to domination of a site by pocosin shrubs ("High Pocosin") on a temporary basis, until pond pines and hardwoods dominated the site. The High Pocosin vegetation type consists of a very dense layer of pocosin shrubs, mostly inkberry, with a scattering of small trees. Pond pine is the most numerous of these trees, but some red maple and loblolly pine are present, indicating past disturbances. This community type contains very few plant species, as the inkberry grows in extremely dense stands. Other shrubs include gallberry, shining fetterbush, and sweet pepperbush. Examples of this community can be seen along the portion of Corapeake Ditch from Myrtle Ditch to the western edge of the state natural area. The only excellent example of this community is found where Myrtle Ditch meets the Virginia line. It is suspected that somewhat recent burning, perhaps by the staff of the Great Dismal Swamp National Wildlife Refuge, has resulted in the continued existence of High Pocosin vegetation at that site.

NATURAL HERITAGE PROGRAM ELEMENT OCCURRENCES

Dismal Swamp Southeastern Shrew (*Sorex longirostris fisheri*)

The Dismal Swamp Southeastern Shrew is listed as Threatened on both the state and federal levels, meaning its continued existence is in jeopardy. In the 1994 inventory, the Dismal Swamp southeastern shrew is common to abundant throughout the state natural area. It inhabits forests, thickets, and brushy fields that are usually damp.

Southern Pygmy Shrew (*Sorex hoyi winnemana*)

The Southern Pygmy Shrew is listed as Special Concern on the state level, meaning that it has been determined by the Wildlife Resources Commission to require monitoring. According to the 1994 inventory, the pygmy shrew is uncommon but widespread in the state natural area. It inhabits various forests and thickets.

Black Bear (*Ursus americanus*)

The black bear has been assigned Significantly Rare status, meaning that while it is neither Threatened nor Endangered, it has been determined to need monitoring. Black bears range over all of the Dismal Swamp. Sightings and bear sign occurred during the 1994 inventory of the state natural area. Black bear inhabit extensive forests and/or pocosins and generally moist sites in the Coastal Plain.

Black Vulture (*Coragyps atratus*)

The black vulture is listed as Special Concern on the state level. The black vulture likely breeds and winters at the natural area, and the last sighting was of a bird flying over. This species requires forested areas for nesting and forest or open country for foraging.

Red-cockaded Woodpecker (*Picoides borealis*)

The red-cockaded woodpecker, a federal- and state-listed Endangered species, has been documented in the state natural area. The last documented sightings of these birds in pond pines along the state line in the eastern portion of the natural area are in the late 1950's and in 1961. Due to fire suppression and the spread of maples in the pond pine areas, the red-cockaded woodpeckers are likely to be extirpated from the entire Dismal Swamp.

Swainson's Warbler (*Limnothlypis swainsonii*)

Swainson's warbler is a member of the North Carolina Natural Heritage Program Watch List, which lists species that are rare or otherwise threatened with serious decline, but which have not yet been placed on the Rare Animal List. This species is a well-known breeding bird in the Dismal Swamp, but it is found primarily in wetter places where cane is abundant and where there is a dense understory layer.

Hessel's Hairstreak (*Mitoura hesseli*)

The Hessel's hairstreak was formerly a federal candidate for listing, but it has been downgraded. This butterfly has been designated as Significantly Rare in North Carolina. It is restricted only to areas of Atlantic white cedar, which is the host plant for the caterpillars.

REGISTERED NATURAL HERITAGE AREAS

White Cedar Registered Natural Heritage Area

The White Cedar Registered Natural Heritage Area contains 218 acres, which comprises roughly 6 percent of the area at Dismal Swamp State Natural Area (Figure V-1). Although the species is widely scattered over the northwestern quarter of the state natural area, there are only two sizable stands of cedar. The stand along the eastern edge of Forest Line Ditch, between Kim Saunders Ditch and Cross Canal, is the one that is readily accessible to visitors. The other large stand lies farther to the east and also lies between Kim Saunders Ditch and Cross Canal.

Atlantic white cedar stands of the extent found in the state natural area are now rare in North Carolina. Most have been logged, and these stands have often not regenerated back to cedar; instead, red maple, sweetgum, and loblolly pine typically have grown in place of the cedar. Even though the cedars at Dismal Swamp still grow in sizable stands, red maple is encroaching and will eventually replace much of the cedar.

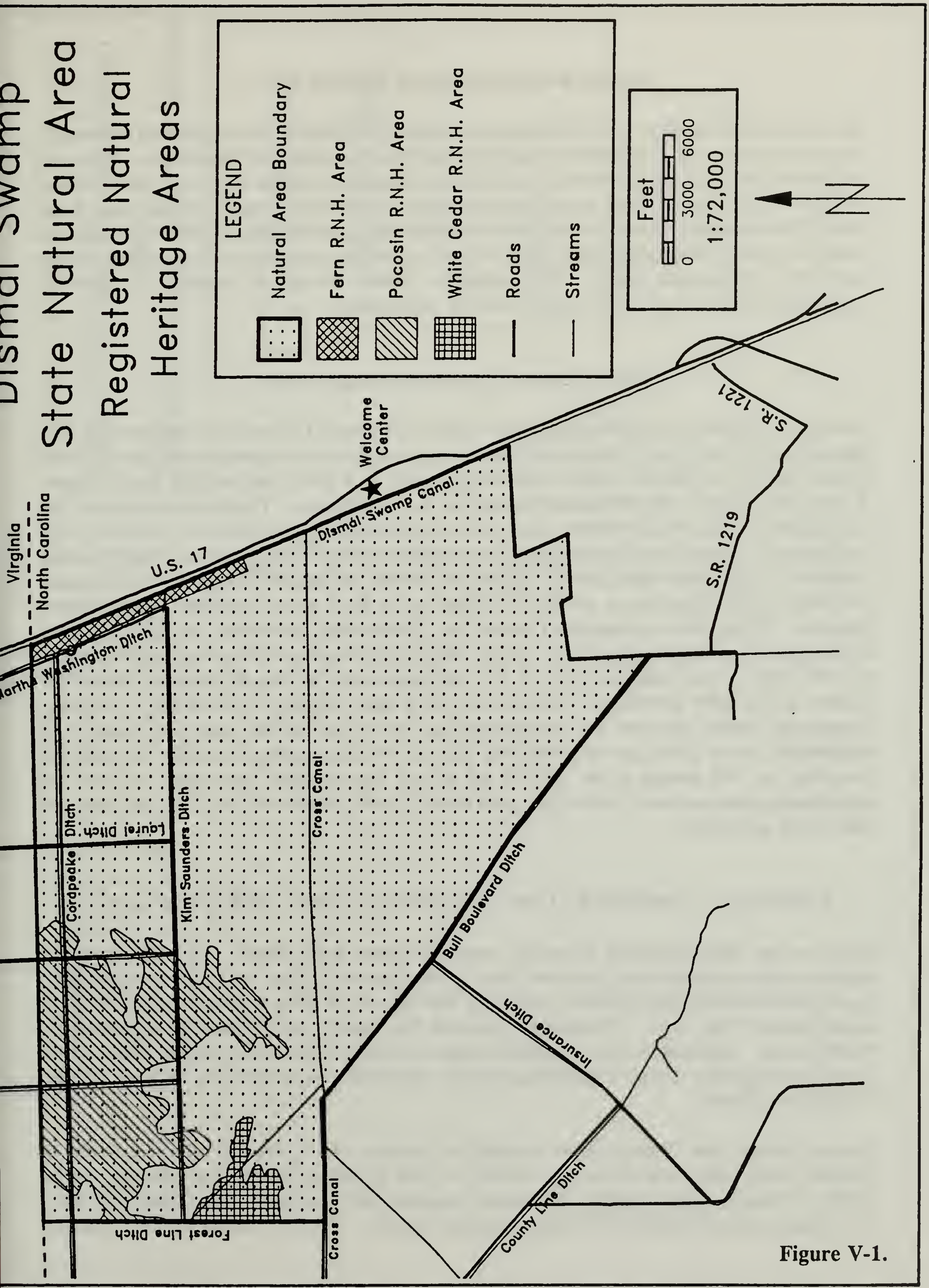

Dismal Swamp
State Natural Area
Registered Natural
Heritage Areas
LEGEND
Natural Area Boundary
Fern R.N.H. Area
Pocosin R.N.H. Area
White Cedar R.N.H. Area
Roads
Streams
Feet
0 3000 6000
1:72,000
Virginia
North Carolina
U.S. 17
Welcome Center
Dismal Swamp Canal
S.R. 1221
S.R. 1219
artha Washington Ditch
Cordpeake Ditch
Laurel Ditch
Kim-Saunders-Ditch
Cross Canal
Bull Boulevard Ditch
Insurance Ditch
County Line Ditch
Forest Line Ditch
Cross Canal

Figure V-1.

Pocosin Registered Natural Heritage Area

The Pocosin Registered Natural Heritage Area contains 1,870 acres. It is considered noteworthy because it is one of the northernmost stands of pocosin vegetation in the United States. Extensive nonriverine pocosins are found only in extreme southeastern Virginia and in the lower Coastal Plain of North Carolina, south to the Green Swamp in Brunswick County. The pocosins found north of the Albemarle Sound do not appear to contain deep peat deposits, and they become more readily invaded by maples and other "non-pocosin" vegetation as a result of long fire suppression and lower groundwater levels. The pocosin at Dismal Swamp is changing in vegetation composition due to water level changes and fire suppression.

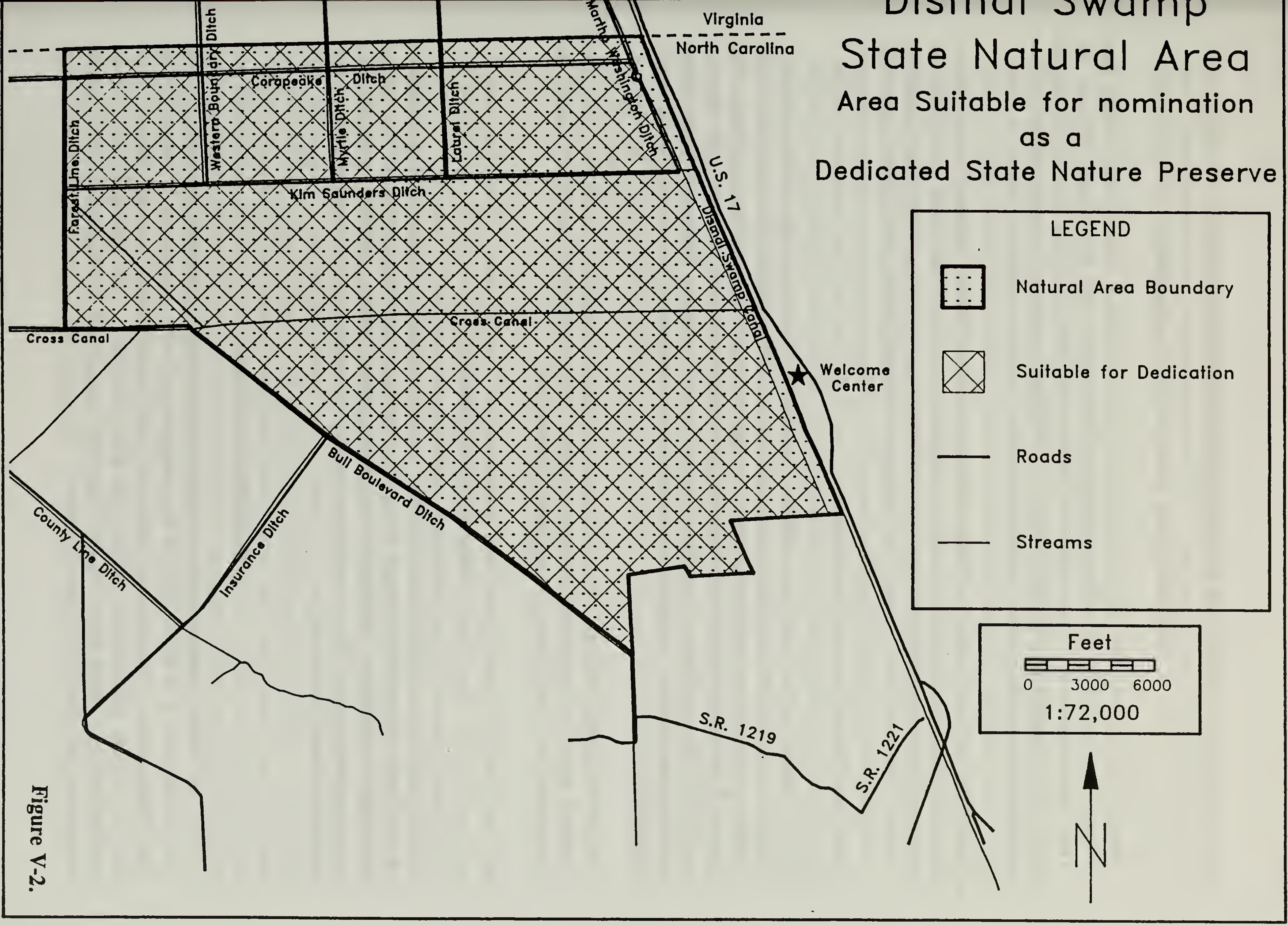
Fern Registered Natural Heritage Area

The Fern Registered Natural Heritage Area contains 171 acres. This area was registered in 1976 because specimens of several species of rare or uncommon ferns were transplanted from the Gates County portion of Dismal Swamp (private property) to a road that parallels South Martha Washington Ditch in the northeastern corner of the natural area. These species are log fern (*Dryopteris celsa*), crested woodfern (*D. cristata*), and spinulose woodfern (*D. spinulosa* = *D. carthusiana*). Fancy fern (*D. intermedia*) and crested woodfern are present in North Carolina mainly in the mountain region, but in Virginia they occur over much of the state. The spinulose woodfern is also found across much of Virginia, but it has a widely scattered range in North Carolina. The log fern is primarily a Coastal Plain species in the two states. The 1994 inventory surveyed much of this registered area. Of the three rare fern species that were transplanted here in 1976, only a few clumps of the log fern alongside South Martha Washington Ditch were located in the 1994 inventory. It is not known if they represent transplanted individuals. Apparently, fancy fern was not transplanted into the State Natural Area, and most or all populations in the SNA can be considered native. Whether crested woodfern or spinulose woodfern are still present in the SNA is not known; but the areas along these canals in the transplanting sites are heavily disturbed, with much loblolly pine as well as sycamore, oaks, and other trees and shrubs.

POTENTIAL ADDITIONS TO REGISTERED NATURAL HERITAGE AREAS

Based on the 1994 biological inventory, nearly the entire State Natural Area is suitable for registry or for nomination as a Dedicated State Nature Preserve (Figure V-2). The only exception is a highly disturbed, roughly linear strip along the berm of the Dismal Swamp Canal, along the eastern edge of the SNA. The portion proposed for registry or dedication is approximately 14,000 acres. This area consists of medium-aged to mature forests, representing at least three natural communities: Nonriverine Swamp Forest, Pond Pine Woodland, and Peatland Atlantic White Cedar Forest.

Dismal Swamp State Natural Area is significant because of: 1) its still-extensive stands of Atlantic white cedar; and 2) its large acreage — over 22 square miles — of unbroken forest, which is home to large numbers of animals, such as the black bear, the bobcat, and many neotropical migratory birds that require extensive forests.



Dismal Swamp
State Natural Area
Area Suitable for nomination
as a
Dedicated State Nature Preserve

Figure V-2.

NATURAL RESOURCE MANAGEMENT ISSUES

Maintaining Fire Lines for Fire Suppression

The U.S. Fish and Wildlife Service maintains the old logging roads in the Dismal Swamp State Natural Area according to a Memorandum of Understanding with the Division (Chapter II). These dirt roads serve as fire breaks as well as the only routes for trucks to travel through the park. One advantage of the MOU is that the USFWS has the heavy equipment needed to mow and maintain the logging roads, something the state parks system currently lacks.

For transportation purposes, the Division should maintain the roads in the Dismal Swamp Natural Area in proportion to the use the roads are anticipated to receive. While hikers or bicyclists can enter the SNA across federal property, non-staff vehicles are not allowed. The existing mowing regime provides sufficient passage for federal and state staff patrols. The USFWS mows the following roads each spring to keep them accessible: Corapeake (from the western park boundary to Laurel), Forest Line, and Kim Saunders.

Fire suppression efforts are not significantly hindered by the current mowing schedule. Maintaining fire breaks by regular mowing is only one factor affecting fire suppression. Fire fighters using road maintenance equipment can clear the vegetation from dirt roads when a fire occurs. Fires in the swamp areas tend to burn slowly and provide greater reaction time. Because the USFWS has sophisticated weather tracking capabilities at the National Wildlife Refuge (including the ability to detect lightning strikes), early detection of fires in the Dismal Swamp is expected.

The Division should maintain the existing mowing schedule in cooperation with the FWS. This schedule should be reexamined when the Division receives sufficient funding to establish an operational unit at the Dismal Swamp State Natural Area.

Natural Heritage Inventory

In 1994 the Division of Parks and Recreation received a grant for a natural heritage inventory of the Dismal Swamp State Natural Area. This inventory provided extensive data on natural communities and animals. Although no rare plant species were found, additional plant inventory work is recommended. This inventory provides a good basis for future inventory and resource management work at this site.

Management Agreement

In 1992, the North Carolina Department of Environment, Health and Natural Resources entered into an agreement with the USFWS for the management of state-owned lands in Dismal Swamp State Natural Area. This agreement allows the Great Dismal Swamp National Wildlife Refuge staff to perform management activities that affect the SNA. The agreement calls for the implementation of sound forest, wildlife, and water management practices based on a resource management plan that has Department approval. This agreement was entered into to: (1) allow hydrologic restoration activities that would affect the SNA, and (2) permit the use of prescribed fire in fire-adapted natural communities in the SNA. These are actions likely to affect areas that cross political boundaries.

Hydrology

The 14,000+ acres of Dismal Swamp State Natural Area lie on the terrace just east of the Suffolk Scarp, a former beach ridge. The entire SNA is flat, lying between 20 and 25 feet above sea level. The Suffolk Scarp lies about 4.5 miles to the west and reaches a height of 50 to 55 feet. The flat basin containing the SNA receives water mostly through ground water seepage from the Suffolk Scarp along the swamp's western edge. Thus, the western portion of Great Dismal Swamp, which in North Carolina is the Great Dismal Swamp National Wildlife Refuge, is wetter than the eastern portion, where the SNA is located.

Before canals were dug into the Great Dismal Swamp, drainage of the swamp was very poorly defined, with no obvious river or creeks. Many canals now occur throughout the Dismal Swamp, however, noteworthy among which is the large Dismal Swamp Canal, dug in the late 1790s, that runs along the eastern boundary. The natural area also contains a grid of small canals or ditches. The extensive canal system has contributed to a loss of wet-soil species, as the soils are considerably drier than they were 200 years ago. These drier soils favor non-obligate wetland trees such as red maple, tuliptree, and sweetgum at the expense of bald-cypress and the tupelos. The USFWS staff at the Great Dismal Swamp refuge are attempting to determine the historic hydroperiod so the current hydroperiod can be modified to more closely mimic the historic or natural hydroperiod.

Fire Management

In areas dominated by pond pine and evergreen shrubs, even though natural wildfires killed some of these plants, the heat of the fires caused the pine cones to release seeds, and the pines were quickly re-established. The shrubs re-established themselves quickly as well, particularly by resprouting. In areas dominated by white cedar, wildfires burned the vegetation, killing the cedar trees; these fires also burned the upper layer of peat, however, allowing cedar seeds stored in the ground to germinate, often producing pure stands. Thus, red maple and other "weedy" trees were kept to a minimum. Although the Pond Pine and Atlantic White Cedar natural communities are fire adapted, a considerable change has occurred in the vegetation in Dismal Swamp State Natural Area in the last 20 years. Fire suppression has contributed to this change. The National Wildlife Refuge staff have started using prescribed burning on a small scale at the refuge in an attempt to gradually reintroduce fire as an ecosystem-level process. Under the 1992 management agreement, the refuge staff may also burn on the SNA. Additional research and experience will be needed before instituting a widespread burn program within the SNA.

Atlantic White Cedar

Approximately six percent of the state natural area (900 to 1,000 acres) contains the Atlantic White Cedar natural community. Currently, red maple is encroaching on the community. These changes to the community are probably caused by the changes to the hydrology of the Great Dismal Swamp and by fire suppression. Efforts to restore hydrology are discussed above. Resource Management Program staff will work with the USFWS staff on plans to maintain this natural community at the SNA.

Resource Management Plan

A comprehensive resource management plan for the State Natural Area addressing these and future issues needs to be developed. This plan should include detailed actions whose implementation will prevent or correct threats or damage to the area's natural resources. The addition of a district resource management specialist would facilitate the development and implementation of this plan.

VI. SUMMARY OF INTERPRETIVE THEMES

The 1987 State Parks Act defines the purposes of the state parks system. It establishes that:

> *The State of North Carolina offers unique archaeologic, geologic, biologic, scenic and recreational resources. These resources are part of the heritage of the people of this State. The heritage of a people should be preserved and managed by those people for their use and for the use of their visitors and descendants.*

It further provides that:

> *Park lands are to be used by the people of this State and their visitors in order to promote understanding of and pride in the natural heritage of this State.*

One of the best methods of meeting these purposes is through environmental education. The Department of Environment, Health, and Natural Resources has adopted the following definition of environmental education:

> *Environmental education is a process that increases awareness, knowledge, and understanding of natural systems -- the interdependence of living things, the impact of human activities -- and results in informed decisions, responsible behavior, and constructive action.*

Dismal Swamp State Natural Area is well suited to environmental education, with its excellent representation of geology and habitat types found in the Great Dismal Swamp.

Dismal Swamp State Natural Area has three primary interpretive themes: the swamp's formation, the history of human activity in the swamp, and the restoration of natural processes in the swamp.

PRIMARY INTERPRETIVE THEMES

Formation of the Great Dismal Swamp

The basic hydrologic requirements for the formation and development of large peat swamps are a humid climate with reasonably uniform rainfall throughout the year, and restricted drainage, both surface and subsurface. The thick, rather impervious clay of the Yorktown Formation, which underlies the entire area, is an effective seal, preventing either downward or upward movement of water. Surface drainage is restricted by the sharp rise of the Suffolk Scarp on the west and by the Fentress Rise on the east. To the north, the flat surface of the Churchland Flat inhibits flow.

The general hydrological conditions necessary for the formation of a swamp existed in the Dismal Swamp area before peat began to form. Studies show that the peat began to form in topographic lows along the stream channels. This, plus the fact that the stream channels had formed, indicates that there was not area-wide ponding in the Dismal Swamp when the peat began to form. As downcutting of the broad shallow valleys of the drainage system proceeded, the silty clay-confining layer was removed, thereby allowing upwelling of water. The addition of this water in an area of poor surface drainage may have been sufficient to trigger the accumulation of peat.

The History of Human Activity in the Swamp

The commercial and agricultural values of the swamp were explored soon after it was discovered by Colonists, including draining the whole area by ditching. The first canal, now called the Washington Ditch, was probably dug in the late 1760's to facilitate the harvesting and removal of the timber. The colonists were very much dependent upon the wood products from the forest. Wood was cheap, easy to obtain, easy to work, and useful in making thousands of items they needed. Juniper and cypress made the very finest charcoal used in making gunpowder.

The Dismal Swamp Canal's "golden age" is generally considered to have been from 1839 to 1860. Hundreds of shingle flatboats, picturesque passenger ships, and freighters plied its length. This had a great effect on the Dismal Swamp as more and more timber was cut and shipped out via the canal and the numerous ditches cut for the purpose.

Virtually the whole swamp has been cut over at least once, although a few small tracts of virgin timber may remain here and there. The first trees to go were the tall junipers — Atlantic white cedar — which were cut for lumber, shingles, barrels, casks, and tubs. For many years, the timber companies in the swamp used narrow-gauge railroads to haul out the logs.

Restoration of Natural Processes in the Swamp

When the swamp was drained, the drier conditions allowed species such as maple and sweet gums to replace the Atlantic white cedar and cypress. Fire suppression also appears to be detrimental to cedar and cypress. A natural-resource management objective of the State Natural Area is to help restore these natural forces. Water control structures are being placed in some of the ditches to help restore the area's natural hydrology. A controlled burn program will benefit the area's natural species.

VII. SITE LIMITATIONS

SOILS

The Dismal Swamp is composed primarily of peat and muck. The thickness of these organic materials is quite variable and is a reflection of the undulating character of the surface of the underlying sedimentary deposits. In addition, the thickness is also a reflection of human activity in the Swamp. This is of significance in those places where the peat and muck, in an undisturbed situation, are relatively thin.

The soils and their patterns of occurrence are in five associations. They are: (1) Typic Medisaprists, (2) Terric Medisaprists, (3) Histic Humaquepts, (4) Typic Umbraquults, and (5) Typic Ochraquults. The North Carolina State Natural Area site contains three of the five known soils in the Dismal Swamp. These three soil associations are the Typic Medisaprists, the Terric Medisaprists, and the Histic Humaquepts. The United States Department of Agriculture, Soil Conservation Service, identifies these soils by generalized local names; in respective order, they are the Dare series, the Ponzer series, and the Wasda series.

All three of these associations are very similar in their composition. They are all organic soils, and all are underlain by mineral soil. The major differences occur in the depth of the peat and muck over this mineral soil base. The Dare series has the deepest peats and mucks (at least 51 inches deep), with the Ponzer association having less depth (between 16 and 51 inches deep), and the Wasda series having the shallowest depths of peats and mucks of the three series (between 8 and 16 inches deep) (Figure VII-1).

A very important characteristic of organic soil materials is that they undergo continuing subsidence under conditions of sustained drainage. To minimize the subsidence and to maintain the integrity of the organic soils, the ground water level should be maintained as high as is practicable.

In general, the soils of the Dismal Swamp are characterized by:

1. Organic soil materials (peats and mucks) underlain at variable depths by mineral soil materials.
2. Poor or very poor internal drainage.
3. Soil reaction that is very strongly acid or extremely acid.
4. Soil temperature regime with a mean annual soil temperature between 59° and 72° F and a mean summer and mean winter soil temperatures which differ by 9° or more.
5. Slow or very slow to ponded surface runoff.

These characteristics present severe limitations for the constructing park roads, buildings, septic fields, and trails because the water table is at or near the surface at least some of each year. Flooding and wetness are common (Tables VII-1 and 2). The peat and muck are deepest in the western section of the park and the shallowest is on the eastern boundary (Figure VII-1). Because all three soil series have severe limitation for construction due to wetness, no new roads or buildings are recommended for the land currently in the Dismal Swamp SNA. It is likely that any trails that are located off of the road network will need to be elevated. All new road or building construction will be located outside of park boundaries.

ACCESS

The state of North Carolina has never owned legal access to the Dismal Swamp State Natural Area. The federal refuge borders the majority of the park's perimeter (northern and western boundaries). Although Division staff members are permitted to enter the park through the federal refuge, this four-mile route is closed to public vehicular traffic. To the east, the site is separated from U.S. 17 by the Dismal Swamp Canal and, according to U.S. Army Corps of Engineers regulations, no structure across the canal may impede boat traffic. The current standard requires any bridge to provide a 65-foot clearance. Private land abuts the SNA's southern-most boundary. Two state roads provide access to these private lands: S.R. 1221 near the canal and S.R. 1219 to the west.

TABLES VII-1 & 2. SOIL LIMITATIONS

	ENGINEERING USES				*RECREATIONAL USES*			
SOIL	*SEPTIC FIELDS*	*SEWAGE LAGOONS*	*ROADS AND STREETS*	*DWELLINGS*	*CAMP-SITES*	*PICNIC AREAS*	*PLAYGROUNDS*	*PATHS AND TRAILS*
Ponzer	*Severe: Wetness, Flooding*	*Severe: Wetness, Flooding*	*Severe: Wetness, Flooding*	*Severe: Wetness, Flooding*	*Severe: Wetness, Flooding*	*Severe: Wetness, Flooding*	*Severe: Wetness, Flooding*	*Severe: Wetness*
Dare	*Severe: Wetness, Flooding*	*Severe: Wetness, Flooding*	*Severe: Wetness, Flooding*	*Severe: Wetness, Flooding*	*Severe: Wetness*	*Severe: Wetness*	*Severe: Wetness*	*Severe: Wetness*
Wasda	*Severe: Wetness*	*Severe: Wetness*	*Severe: Wetness*	*Severe: Wetness*	*Severe: Wetness*	*Severe: Wetness*	*Severe: Wetness*	*Severe: Wetness*

SOIL	*FLOODING HAZARD RATING*	*WETNESS RATING*
Ponzer	*Very frequent ponding for very long periods*	*Water table at or near the surface for 6 to 12 months*
Dare	*Frequent ponding for very long periods*	*Water table at or near the surface for 6 to 12 months*
Wasda	*Frequent ponding for long periods*	*Water table at or near the surface for long periods*

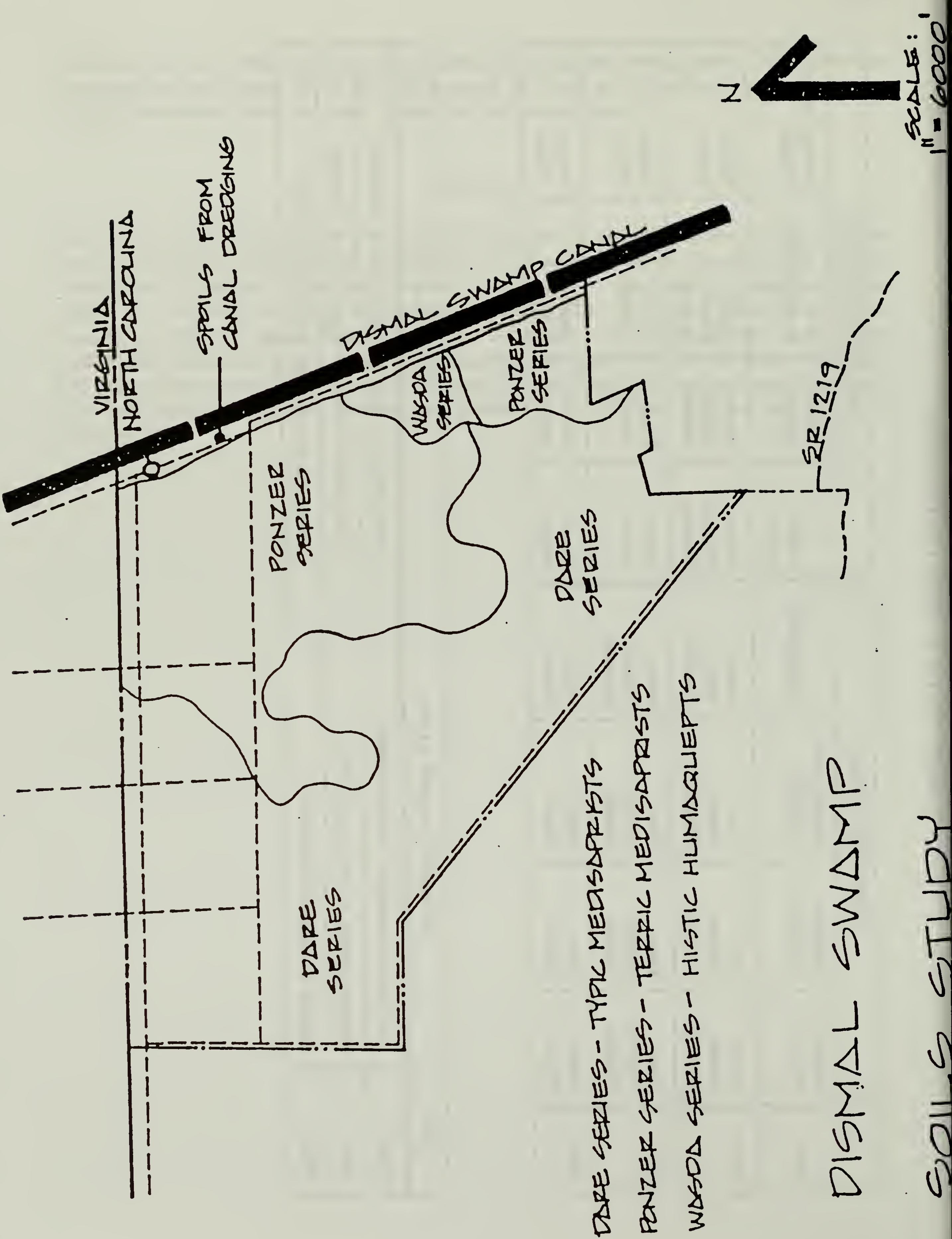

VIRGINIA
NORTH CAROLINA
SPOILS FROM CANAL DREDGING
DISMAL SWAMP CANAL
PONZER SERIES
WASDA SERIES
PONZER SERIES
DARE SERIES
DARE SERIES
SR 1219
N
SCALE: 1" = 6000'
DARE SERIES - TYPIC MEDISAPRISTS
PONZER SERIES - TERRIC MEDISAPRISTS
WASDA SERIES - HISTIC HUMAQUEPTS
DISMAL SWAMP
SOILS STUDY

Figure VII-1.

VIII. OPERATIONS ISSUES

HOW SHOULD THE STATE NATURAL AREA BE MANAGED?

Issue: Which agency should manage the Dismal Swamp State Natural Area? If the site is managed by the state parks system, should it be operated as a separate unit or continue to be operated as a satellite unit?

Background: The Dismal Swamp State Natural Area was assigned to Merchants Millpond State Park as a satellite unit in 1985, but no permanent staff have ever been assigned to Dismal Swamp. In fact, the Merchants Millpond General Management Plan recommends seven additional positions to adequately maintain that park alone (two park rangers, two maintenance positions, and three seasonal maintenance positions).

The Great Dismal Swamp National Wildlife Refuge manages Dismal Swamp under the terms of a Memorandum of Agreement between the Division of Parks and Recreation and the U.S. Fish and Wildlife Service, signed in 1992. The natural resource management objectives of the federal refuge are compatible with N.C. state parks system policies. In fact, the effort to restore the swamp's hydrology is best served by a uniform approach for state and federal land. The National Wildlife Refuge also has an automated weather station that can plot lightning strikes and predict fire potential/behavior and suppression techniques that are needed in a given situation. Because the refuge contains approximately 150 miles of roads, the USFWS has the heavy equipment and trained operators needed to maintain the roads on both state and federal property.

Recommendation: The Division of Parks and Recreation should continue the MOU with the USFWS until the state of North Carolina provides sufficient staffing, equipment, and administrative/visitor facilities to operate the state natural area in a manner consistent with the mission of the North Carolina State Parks System. When sufficient state resources are available, Dismal Swamp State Natural Area should be open to the public as a state parks system unit.

CONTROLLING ILLEGAL ACTIVITIES

Issue Statement: Illegal activities, such as hunting, are occurring at the Dismal Swamp State Natural Area.

Background: In October 1972, The Dismal Swamp Study Act (P.L. 924-78) authorized the Secretary of the Interior to conduct a suitability/feasibility study of the Dismal Swamp for the purposes of preservation and protection. In December 1973, the North Carolina Office of Recreation Resources recommended managing the area as a wildlife habitat, allowing public hunting, and constructing support facilities (such as camp sites) sufficient only for the needs of hunters based on the federal feasibility study. In 1974, the state of North Carolina established Dismal Swamp State Park by purchasing 14,344 acres from The Nature Conservancy for $2.2 million.

In April 1976, the N.C. Wildlife Resources Commission (WRC) conducted a public hearing to discuss proposals for hunting in Dismal Swamp. One comment in favor of hunting and one comment against were received. In the fall of 1976, the Division of Parks and Recreation and the WRC agreed to limit hunting to a 5,000-acre portion of the original Dismal Swamp Game Lands. Because there was no publicly owned access, a park ranger had to escort hunters across federal refuge land and private land, using Corapeake Road. There was no formal right-of-way agreement with landowners. The park ranger issued three hunting permits in 1976 and subsequently discovered signs of vandalism and vehicle illegally entering the site. In March 1977, the WRC deleted the state-owned portion of Dismal Swamp from the game lands program, based upon the WRC staff recommendation; hunting at Dismal Swamp State Park became illegal.

Evidence indicates that hunting has continued illegally since 1977. Hunters have been arrested by National Wildlife Refuge rangers; WRC officers have stopped individuals in possession of hunting rifles and hunting clothes; park staff have discovered deer carcasses; and vehicle tracks have been made in areas closed to the public.

Recommendations: Continue to prohibit hunting and enforce park rules and regulations. The Division should provide adequate staff, support equipment, and budget so that Dismal Swamp can be operated as a State Natural Area in a manner consistent with the mission of North Carolina state parks system.

RADIO COMMUNICATIONS

Issue Statement: No radio communication is available between state and federal agencies.

Background: This issue is closely related to radio communications problems discussed in the Merchants Millpond GMP. In addition to existing inadequate radio communications at Merchants Millpond State Park, park staff members cannot communicate with each other by radio from the park to the natural area.

Recommendations: This issue should be addressed as part of the existing two-way radio communications problems at Merchants Millpond State Park. One or more technical experts should visit the area and view the on-ground situation with Division personnel. A written proposal should be developed for providing reliable radio communications between Merchants Millpond and Dismal Swamp. This upgraded system should include communications capability between the park and the local sheriff's department and/or other appropriate agencies, such as the USFWS. Upgrading the existing radio system should be undertaken regardless of whether the Dismal Swamp State Natural Area is administered as part of Merchants Millpond State Park or as a separate entiry, and whether or not developed visitor facilities are provided at Dismal Swamp. If visitor facilities are provided, it will be even more important to have reliable two-way radio communications supporting emergency response personnel in this rugged and remote terrain.

Table VIII-1. Radio Frequencies of Public Agencies Near Dismal Swamp

Agency	Tower/Comment	Receive	Transmit
N.C. Wildlife Resources Commission			
	Ahoskie Tower (for MEMI)	159.2850	1513250
	Private Line	173.8	
	Talk Around	151.3250	151.3250
	Columbia Tower (for Dismal Swamp)	159.3150	151.4600
	Private Line	173.8	
Dismal Swamp National Wildlife Refuge			
	Recommends 100 watt mobile radio	164.625	163.150
	Tone Guard	173.8	
Hertford Co. Sheriff's Dept. Dispatcher			
	Also serves as dispatcher for all Gates County Emergency Services	460.175	154.100
	Second Frequency	154.7400	155.5200
	Private Line	203.5	
Gates County Sheriff's Department		460.175	465.175
Pasquotank County Sheriff's Department			
	Serves as dispatcher for Camden County	460.075	460.075

MASTER PLAN

IX. MASTER PLAN

INTRODUCTION

The Dismal Swamp State Natural Area master plan identifies land acquisition boundaries needed to protect the site's natural resources, describes the major interpretive themes, and describes the physical plant needed to accommodate public use. The original master plan for Dismal Swamp, written in 1974, has been reviewed to determine if changes are needed. Factors considered include: the park purpose statement, relevant laws and policies, natural heritage inventory, park management considerations, public opinion expressed through public involvement efforts, recreation demand, and park visitor safety. The review resulted in this revised master plan, which replaces the 1974 plan.

The Division should continue cooperate with the U.S. Fish and Wildlife Service to manage the site according to the Memorandum of Understanding until sufficient state park staffing, equipment, and administrative/visitor facilities are available. The state of North Carolina should provide adequate staff, equipment, and funds in the future so that Dismal Swamp can be operated as a state natural area in a manner consistent with the mission of North Carolina State Parks System. When sufficient state resources are available, Dismal Swamp State Natural Area should be opened to the public as a state parks system unit.

The master plan goals are to protect the significant biological, geological, scenic, and recreational resources and providing park experiences that promote pride in and understanding of site's natural heritage. Protecting the four noteworthy natural communities (Nonriverine Swamp Forest, Pond Pine Woodland, Peatland Atlantic White Cedar Forest, and High Pocosin) is a particularly high priority. These natural communities have been identified in existing and proposed Registered Natural Heritage Areas. Management practices are also recommended to restore the natural processes that have been altered through human intervention.

The park provides an opportunity for visitors to experience an extensive east coast swamp and pocosin complex. Activities at the state natural area should promote the park's interpretation and education goals. The extensive road system can support wildlife viewing, long-distance hiking, and bicycling. Because of the soil types present, only limited visitor facilities are possible.

The soils at the Dismal Swamp State Natural Area are primarily peat and muck, which severely limit any type of construction or road building because of wetness and flooding. These soil conditions make it nearly impossible to locate buildings or new roads within the current park boundaries. All buildings and roads recommended in the revised master plan are located outside of current park boundaries on land that does not have these constraints.

The revised master plan addresses the interest, expressed at the public meeting, to increase interpretation and education, public use, and facilities at Dismal Swamp State Natural Area by proposing a visitor center on the east bank of the Dismal Swamp Canal with exhibit space and an auditorium (Figure IX-1). Ferry service across the Dismal Swamp Canal at the park visitor

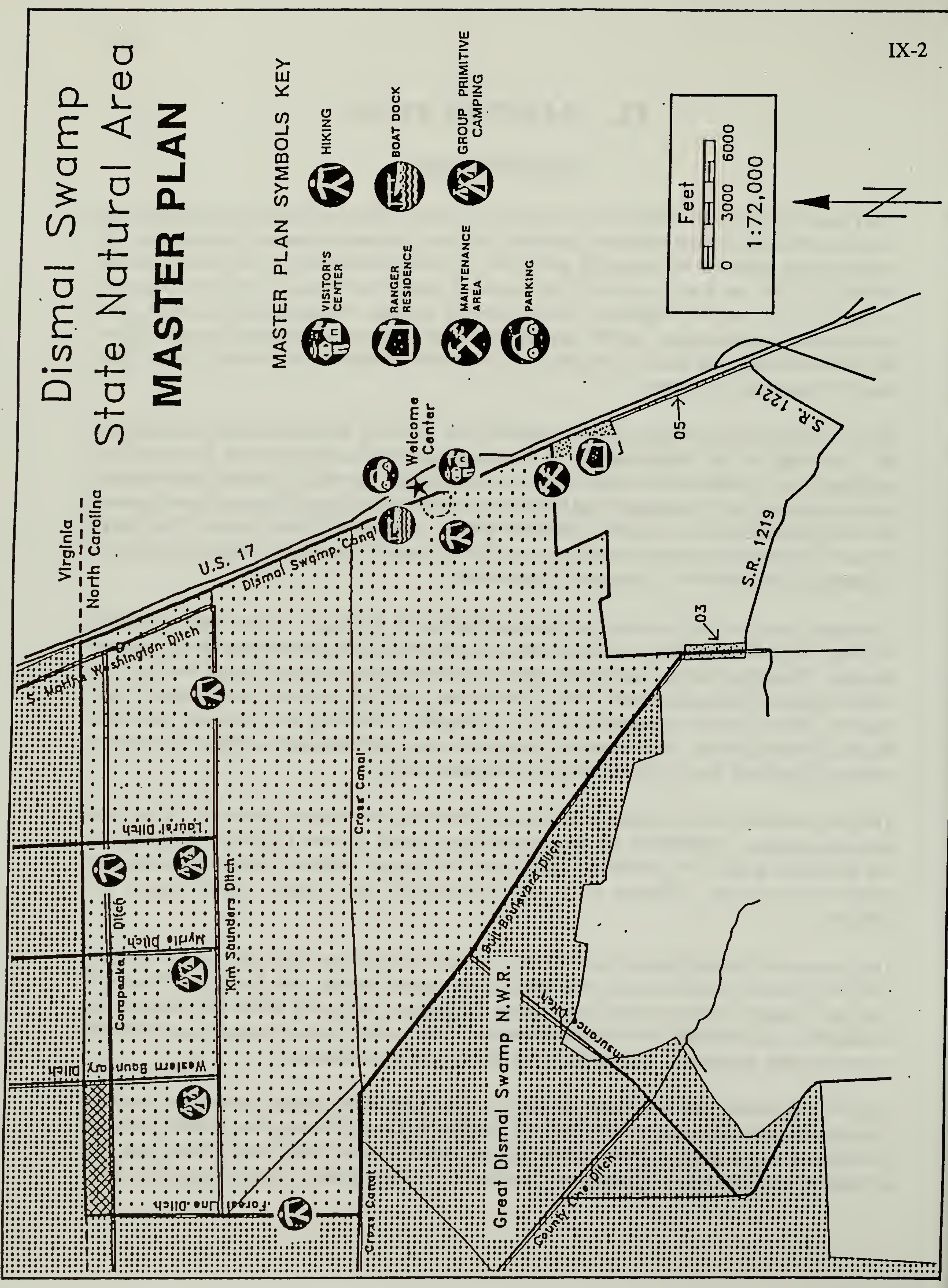

Dismal Swamp
State Natural Area
MASTER PLAN
MASTER PLAN SYMBOLS KEY
VISITOR'S CENTER
HIKING
RANGER RESIDENCE
BOAT DOCK
MAINTENANCE AREA
GROUP PRIMITIVE CAMPING
PARKING
Feet
0 3000 6000
1:72,000
Virginia
North Carolina
U.S. 17
Dismal Swamp Canal
Welcome Center
S.R. 1221
S.R. 1219
05
03
Martha Washington Ditch
Laurel Ditch
Corapeake Ditch
Myrtle Ditch
Kim Saunders Ditch
Western Boundary Ditch
Forest Line Ditch
Cross Canal
Bull Boulevard Ditch
Great Dismal Swamp N.W.R.
Insurance Ditch
County Line Ditch

Figure IX-1.

center will take visitors to a representative area of the swamp and does not impede boat traffic on the canal. The facilities on the west bank include a maintenance area, ranger residence, primitive camps, trail improvements, and an interpretive trail boardwalk with an overlook area. Primitive group camps are needed for nature-study groups who wish to spend several days in the park.

INTERIM MANAGEMENT

Dismal Swamp State Natural Area should continue to be managed by the U.S. Fish and Wildlife Service (USFWS) using the Memorandum of Understanding (MOU) until adequate state funding is available for operations, capital improvements, and natural resource management. The MOU, signed in 1992, greatly improves natural resource management at the site. Dismal Swamp State Natural Area is a satellite unit of Merchants Millpond State Park, and resources at that park have historically fallen short of operating needs. The USFWS's staff and equipment available to manage the site currently exceed state park resources, and the agency's Great Dismal Swamp National Wildlife Refuge is adjacent to the area. Under the MOU, greater progress can be made toward the management objectives of restoring the natural hydrology and introducing prescribed burns to manage fire-dependent natural communities. The National Wildlife Refuge also has modern lightning and fire detection equipment that should help identify potential wildfires.

MASTER PLAN DEVELOPMENT

Visitor Center

The park visitor center will be located south of the Dismal Swamp Canal Visitor Center and Welcome Center on the land between U.S. 17 and the canal (Figure IX-2). The Welcome Center would be a means of attracting visitors to the park, while the park would become an additional attraction for the Welcome Center to use in promoting tourism. The visitor center will have an exhibit area, auditorium, and office space, and should accommodate a range of visitor interests. Some visitors will simply want a brief diversion from traveling; others will use the ferry for a quick visit to the swamp. Because of the extensive trail system at Dismal Swamp State Natural Area, some hikers and bicyclists will take day-long outings through the site, perhaps with the Atlantic white cedar forests as a destination. Finally, groups interested in interpretive programs will be attracted to presentations in the auditorium and the guided nature hiking.

Public Access

Ferry service across the Dismal Swamp Canal near the Welcome Center/Visitor Center will take visitors to a representative area of the swamp. Two docks, one on each side of the canal, will be needed to accommodate this service. Additional space will be needed to serve private boats as well as the park ferry. The docks will be constructed to conform with the federal regulation prohibiting structures that infringe on the width of the canal.

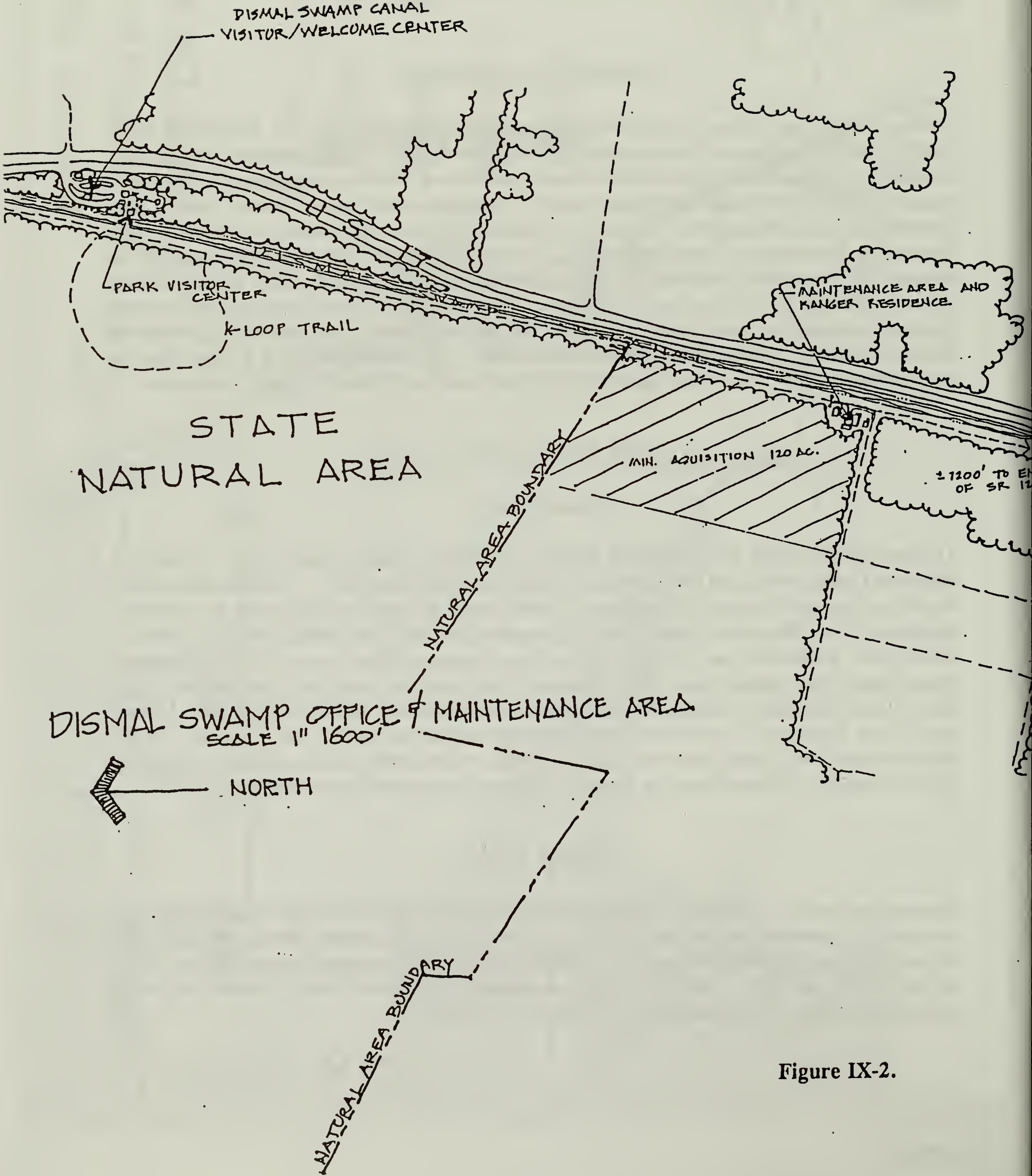

DISMAL SWAMP CANAL
VISITOR/WELCOME CENTER
US 17
PARK VISITOR CENTER
LOOP TRAIL
MAINTENANCE AREA AND
RANGER RESIDENCE
STATE
NATURAL AREA
MIN. AQUISITION 120 AC.
±1200' TO EN
OF SR 12
NATURAL AREA BOUNDARY
DISMAL SWAMP OFFICE & MAINTENANCE AREA
SCALE 1" 1600'
NORTH
NATURAL AREA BOUNDARY

Figure IX-2.

Exhibits and Trails

When visitors cross the canal, they will find an exhibit near the boat dock that provides information on the State Natural Area. A self-guided interpretive trail through the swamp would serve those visitors with limited time to spend in the area. Visitors taking longer hikes or bicycle rides would use the network of ditch shoulders as routes through the swamp. The shortest route to the Atlantic white cedar area is a ten-mile round trip traveling along the Kim Saunders Ditch. As visitor use increases, the Division would determine if additional trails were needed to promote the interpretation and education objectives while not harming the natural resources. The park trails also provide opportunities to view an abundance of wildlife. To enhance these opportunities, observation stands should be placed in areas where long-distance views are available.

Staff Access

To adequately manage the 14,344-acre Dismal Swamp State Natural Area, the state must acquire and control its own access road. There are only two potential routes to connect park property with a public road, both on the southern boundary. The first alternative is S.R. 1219, west of S.R. 1221, terminating near the southwest corner of the state's property. While S.R. 1219 can be connected to the park via Bull Boulevard, the drive to the canal via Kim Saunders Ditch is between 8 and 10 miles, one way. In addition, the soils in the southwest corner of the state's property are unsuitable for nearly all development. S.R. 1221, the second alternative, parallels the Dismal Swamp Canal and terminates near the southeast corner of the state's property. This option presents the better opportunity to reach the eastern edge of the park, where the soils are more able to support roads and buildings.

Operations Area

A park maintenance area and ranger residence should be located next to the canal, just south of the park's southeast corner. This location is suitable for the roads and buildings needed in the maintenance area. Developing this location will require purchasing a 120-acre tract and an access road that connects to S.R. 1221.

Primitive Camping

Primitive group camps are needed for groups who wish to spend several days in the park. Groups interested in the Atlantic white cedar stands will find these campsites particularly useful because the travel time between the visitor center and cedar stands invites overnight stays. Specific sites should be located where impacts to the park's natural resources will be minimized. If the sites are to be located off the old logging roads, elevated decks will be needed.

X. PLAN REQUIREMENTS

CAPITAL IMPROVEMENT COST ESTIMATES

The Dismal Swamp State Natural Area should be developed as a single project; it should not, however, be established as a separate unit until sufficient staffing, equipment, and administrative/visitor facilities are available. Minimal staffing or management resources will result in inadequate stewardship of the natural resources and will hamper essential visitor services. Capital improvement project descriptions include detailed construction cost information, proposed site locations, and the rationale for the project as well as the estimated annual cost of properly operating and maintaining the project. Complete project descriptions provide the most accurate information on proposed changes to the original master plan (Appendix C).

Table X-1. Capital Improvement Project Cost Estimates.

DESCRIPTION	TOTAL COST
General Park Development - Construction of a visitor center on the east bank of the Dismal Swamp Canal and support facilities on the west bank. The visitor center is a multi-use building containing the reception area, exhibit area, auditorium, office space, access road, parking lot, storage space, exhibits, furniture, and equipment. These facilities on the west bank include a maintenance area, ranger residence, primitive camps, trail improvements, and an interpretive trail boardwalk with an overlook area. The maintenance area is land dependent.	$3,064,400

LAND ACQUISITION NEEDS

Current Status

Dismal Swamp State Natural Area currently contains 14,343.5 acres. Although the Division currently has no legal public access, it can be reached via Corapeake Ditch Road, which crosses Great Dismal Swamp National Wildlife Refuge lands to the west. The deed for the northwest portion of the state natural area contains a provision that gives the National Wildlife Refuge the right to cross the state natural area on Corapeake Ditch Road and Western Boundary Ditch Road. These roads across state property are the only way at present for the Refuge staff and its visitors to reach Refuge lands to the north of the state natural area.

Proposed Additions and Deletions

The 1974 master plan for the State Natural Area called for three rights-of-way to be acquired for legal access. Obtaining legal access is still a top management priority and needs to be pursued. Acquisition of approximately 49 acres to provide access rights from S.R. 1219 to Bull Boulevard at the southern tip of the state natural area is still needed (Figure X-1). This right-of-way will provide visitors with access to this part of the state natural area as well as an access point for management needs. If this land cannot be acquired, another possibility to gain access to this side of the state natural area is to acquire access rights along Insurance Ditch Road to Bull Boulevard.

Another access we must acquire runs from the end of S.R. 1221 north along the west bank of the Dismal Swamp Canal for approximately 7,200 feet. A total of approximately 25 acres will be needed for a 150-foot-wide right-of-way. A farm road now runs along the bank from S.R. 1221 to the state natural area boundary. This access on the east side of the state natural area will provide a route to the proposed maintenance area and ranger residence as well as an access point for management needs.

The third right-of-way proposed in the master plan is along Corapeake Ditch Road from N.C. 32. It is unnecessary and should not be pursued. Management access along Corapeake Road on National Wildlife Refuge lands already exists through a cooperative agreement. A public access right-of-way to the Natural Area along Corapeake Ditch Road would conflict with Refuge management policies and is not as convenient as the other proposed access points.

During the master plan revision, approximately 125 acres were identified that need to be added to the state natural area's master plan boundary (Table X-2). This acreage is southeast of the existing boundary along the Dismal Swamp Canal. It is farmland of negligible natural resource value that is needed for a proposed maintenance center and ranger residence. In addition, approximately 201 acres in the northwest corner of the state natural area were identified during the Master Plan revision process that may be sold to the National Wildlife Refuge. Currently, hunters on the National Wildlife Refuge lands to the north of the state natural area have the right to cross Corapeake Ditch Road and Western Boundary Ditch Road within the state natural area to hunt on Refuge lands. Taking these roads out of the state parks system will avoid future hunter trespass problems when visitor use of the state natural area increases.

Table X-2. Master Plan Acreage Needs.

Description	Acreage
1995 size of Dismal Swamp State Natural Area	14,343.5
Original master planned needs	74.0
Additional master planned needs	125.0
Master planned deletions	-201.0
Revised master planned size	14,341.5

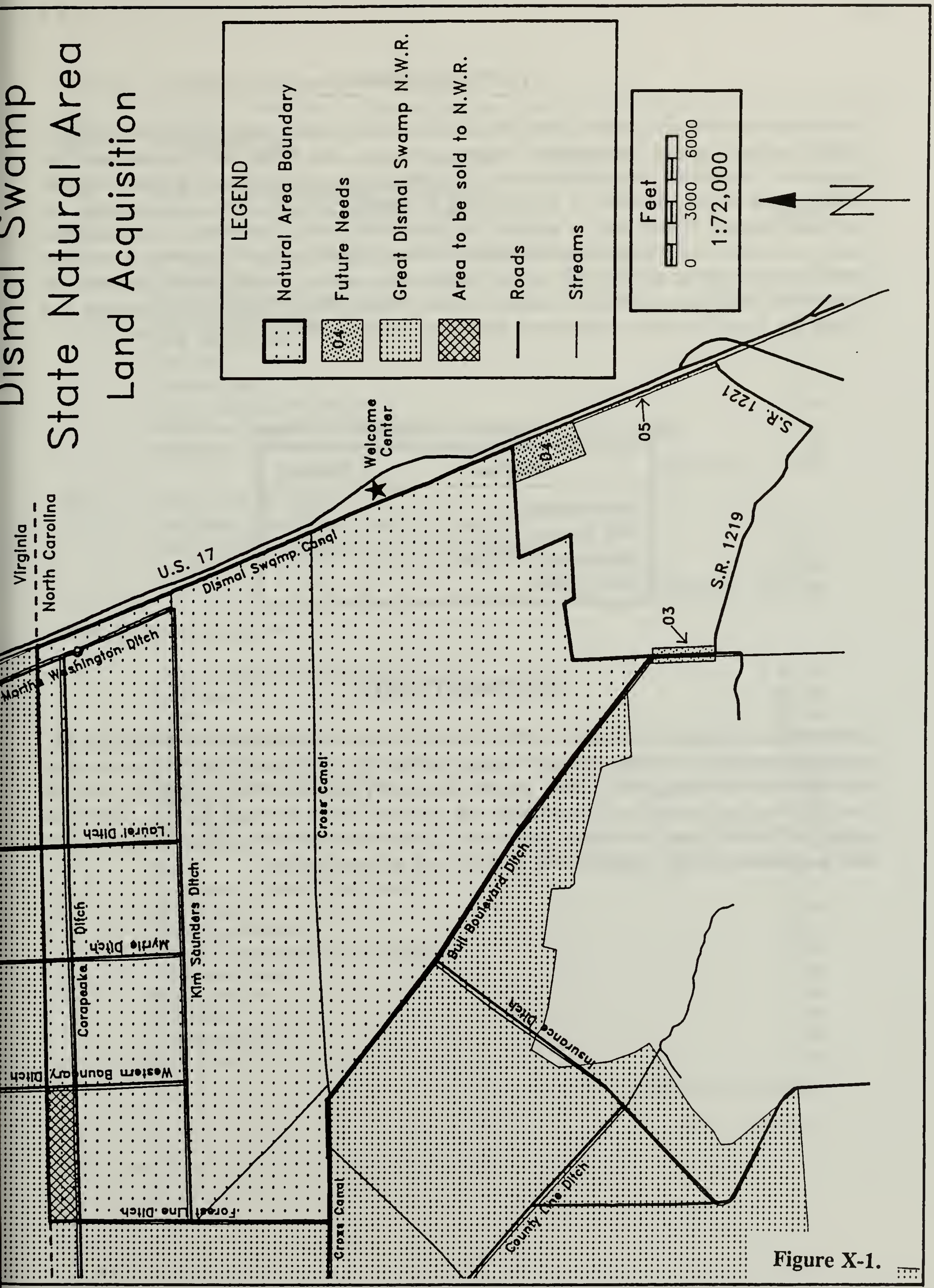

Dismal Swamp
State Natural Area
Land Acquisition
LEGEND
Natural Area Boundary
Future Needs
Great Dismal Swamp N.W.R.
Area to be sold to N.W.R.
Roads
Streams
Feet
0 3000 6000
1:72,000
N
Virginia
North Carolina
U.S. 17
Dismal Swamp Canal
Welcome Center
04
05
03
S.R. 1221
S.R. 1219
Martha Washington Ditch
Laurel Ditch
Myrtle Ditch
Corapeake Ditch
Kim Saunders Ditch
Western Boundary Ditch
Forest Line Ditch
Cross Canal
Bull Boulevard Ditch
Insurance Ditch
County Line Ditch

Figure X-1.

STAFFING NEEDS

Park rangers perform four primary functions (listed in priority order): interpretation and education (I&E), natural resource management, visitor protection and safety, and maintenance and operations. In addition, superintendents are responsible for administration. Without adequate staffing, park rangers are able to provide only a custodial level of care. Consequently, an inordinate amount of staff time is spent on less important routine maintenance and operations tasks. Interpretation & education and natural resource management duties, which are most important and essential to achieving the state parks system mission, receive inadequate attention. Seven staff positions are needed to manage Dismal Swamp State Natural Area according to a review the natural resource management needs and proposed visitor facilities (Table X-2).

Table X-2. Permanent Staff Positions Needed.

Position	Number
Superintendent	1
Park Ranger	2
Maintenance Workers	3
Clerk Typist	1

EQUIPMENT NEEDS

The following equipment is needed for effective natural resource management, interpretation and education, emergency services, and maintenance (Table X-3). Maintaining the dirt roads created when the area was managed for timber requires more heavy equipment than most North Carolina state parks typically need (e.g. road grader and a tractor with a front-end loader). The radio system at Dismal Swamp is a critical component of any search-and-rescue efforts because of the park's extensive acreage, limited roads or trails, and uniform terrain.

Table X-3. Equipment Needs and Estimated Costs.

Line Item	CATEGORY/Item	Cost
5100	**OFFICE FURNITURE AND EQUIPMENT**	
	Desks (4), Computer Workstation, Copier, Fax, etc.	$ 9,550
5300	**EDUCATIONAL, MEDICAL, AGRICULTURAL EQUIPMENT**	
	TV and VCR	750
	35mm Camera with Assorted Lens	800
	Slide Projector w/ Lens	850
	Slide Storage Case	800
	Camcorder	1,000
	Spotting Scope	800
	Stereo Compound Microscope	1,000
	Microscope Lens (60 mm, 300-400mm)	1,500
	Herbarium	1,200
	SUBTOTAL:	**$ 8,700**
5400	**MOTOR VEHICLES**	
	Four-Wheel Drive Pickup Trucks (2 @ $18,000)	$ 36,000
	Four-Wheel Drive Maintenance Vans (3 @ $18,000	54,000
	Dump Truck	30,000
	SUBTOTAL:	**$120,000**
5500	**OTHER EQUIPMENT**	
	Tractor with Backhoe and Front-end Loader	$ 30,000
	Road Grader	100,000
	Tractor	70,000
	Side-mounted Boom Ax	30,000
	Deck Mower	3,000
	Mechanic's Tool Set with Chest	1,300
	Weed Eater	600
	Push Mower	550
	Chain Saw	700
	Radios	7,900
	Radio Marti/ Antenna/ Office Radio	20,000
	Shop Tools	1,000
	Riding Lawn Mower	8,000
	Pumper Units for Truck (2 @ $8,000)	16,000
	All-Terrain Vehicle	6,000
	Radial Arm Saw	1,500
	Table Saw	1,200
	12-inch Band Saw	1,200
	Joint Planer	1,700
	SUBTOTAL:	**$300,650**
	TOTAL:	**$429,350**

APPENDIX A

DISMAL SWAMP STATE NATURAL AREA
PARK PROFILE

DISMAL SWAMP STATE NATURAL AREA PURPOSE STATEMENT

November 1, 1994

North Carolina purchased Dismal Swamp State Park in 1974 from the Nature Conservancy using a federal Land and Water Conservation Fund (LWCF) matching grant. The U.S. Department of the Interior funded the grant from the Secretary's contingency reserve based on specific criteria. The land acquisition project was approved because it sought to preserve a unique natural resource (a portion of the Great Dismal Swamp) and it was of broad significance (the swamp was the largest swamp on the Atlantic coast). The grant states that the park is to "... *be retained as a natural preserve with only minimal future development to promote the preservation and interpretive theme.*" In the late 1980's, the park unit's designation was changed from state park to state natural area.

Dismal Swamp State Natural Area is a vast, forested wetland containing four noteworthy natural communities: a Nonriverine Swamp Forest, a Pond Pine Woodland, a Peatland Atlantic White Cedar Forest, and High Pocosin. The plant communities historically present in the Dismal Swamp were changed over 200 years ago when the area was drained and timbered. The ditches and roads that were constructed have altered the natural hydrology and, as a result, made conditions less favorable to cypress and cedar forests. The natural fire regime has also been affected by the ditches, roads, and fire suppression. As a result, hardwoods have invaded the pocosins and cedar forests. The Dismal Swamp's natural hydrology should be restored and fire management should be implemented in order to recreate these natural processes. The swamp supports a large variety of migratory neotropical birds, mammals (including the Threatened Dismal Swamp southeastern shrew, black bear, and bobcat), reptiles, and amphibians. It also supports a significant butterfly fauna.

The significant geological resource is the swamp, which was formed by gradual peat deposition on a fairly flat, poorly drained surface. The area is bounded by the Suffolk Scarp west of the park and by the Fentress Rise to the east. Underlying much of the swamp is the Yorktown formation, an impermeable clay that acts as an effective barrier against upward or downward water movement. Although the state natural area and the adjacent national wildlife refuge protect a combined 120,000 acres of the Great Dismal Swamp, at least half the original acreage has been drained.

Significant archaeologic resources have not been discovered. The Dismal Swamp is thought to have been a prime hunting and fishing area for Native American tribes prior to European settlement. Although hunting lodges were maintained around the perimeter of the swamp, no evidence exists that any permanent villages were established in the swamp. The area has a rich cultural history. William Drummond, first governor of North Carolina, explored the area, and George Washington helped sponsor the digging of the first ditch. Virginia Governor Patrick Henry proposed Great Dismal Swamp Canal, which has been listed on the National Register of Historic Places.

The park provides an excellent opportunity to experience an extensive East Coast swamp and pocosin complex. Activities that promote the park's interpretation and education goals should be emphasized. The extensive road system can support long-distance hiking and bicycling. Because of the soil types present, only limited visitor facilities are possible.

The most significant scenic resources are the Atlantic white cedar stands and the extensive forested area. Although present trails are located exclusively on straight road beds, they provide opportunities to view wildlife and extensive forests. Additional opportunities to view the swamp are possible if trails are constructed off the ditches.

Dismal Swamp was authorized as a state natural area so that its valuable biological, geological, scenic, and recreational values could be protected. The Division of Parks and Recreation is charged with preserving these values and providing park experiences that promote pride in and understanding of North Carolina's natural heritage.

PRIMARY INTERPRETIVE THEMES

1. Formation of the Great Dismal Swamp
2 The history of human activity in the swamp
3. Restoration of Natural Processes in the Swamp

EXISTING VISITOR FACILITIES

None

CONSTRUCTION AND RENOVATION NEEDS

1. **General Park Development:** The project will include construction of a visitor center on the east bank of the Dismal Swamp Canal and support facilities on the west bank. The visitor center is a multi-use building containing the reception area, exhibit area, auditorium, office space, access road, parking lot, storage space, exhibits, furniture, and equipment. These facilities on the west bank include a maintenance area, ranger residence, primitive camps, trail improvements, and an interpretive trail boardwalk with an overlook area. The maintenance area is land dependent.

LAND ACQUISITION NEEDS

Summary Table

1995 size of the Natural Area	14,343.5 acres
Original master planned needs	74.0 acres
Additional master planned needs	125.0 acres
Master planned deletions	-201.0 acres
Master planned size of the Natural Area	14,341.5 acres

PERMANENT STAFF POSITIONS NEEDED

Position	Number
Superintendent	1
Park Ranger	2
Maintenance Mechanic	2
Clerk Typist	1
General Utility Worker	1

APPENDIX B

DISMAL SWAMP STATE NATURAL AREA PUBLIC MEETING

On September 19, 1994, a public meeting was held in Elizabeth City to give citizens an opportunity to make suggestions about the future of the Dismal Swamp State Natural Area. The Division sought to increase attendance by mailing meeting notices to recreation professionals, mayors, chairmen of county commissions, park advisory committee members, conservation groups, and interested local citizens. Press releases, media coverage, and notices placed in the parks were also used to promote attendance. The total number of attendees was 14.

Methodology

After staff presented an overview of the state park and explained the meeting's purpose, attendees were asked to respond to the question, "What are your suggestions for the future of Dismal Swamp State Park?"

When all comments and suggestions had been recorded, attendees were asked to review the list and select the first, second, and third most important suggestions, with the first receiving three points, the second two points, and the third one point. This ranking allowed priorities to be established for the groups' suggestions. As a final step, groups were asked to suggest ways to satisfy the highest priority needs identified.

Suggestions for Management Direction

1. Bring education and interpretation/stewardship/conservation together. (18 votes)
2. Need cooperative effort with N.C. Division of Forestry: Education/management/use. (13 votes)
3. Update development plans with US Fish & Wildlife Service to avoid duplication of facilities, programs, personnel, etc. (10 votes)
4. Establish some facilities to encourage eco-tourism, especially near US 17 welcome/visitor center. (5 votes)
5. Restore natural hydrology. (4 votes)
5. State pay back feds and turn over to N.C. Forest Service. (4 votes)
6. Allow more public access from the south. (3 votes)
6. Determine LWCF requirements for conservation purposes and compare to current management. (3 votes)
6. State should manage park (Forest Resources if not Parks & Recreation). (3 votes)
6. Use park resources to generate some funding for the park in cooperation with Forest Resources. (3 votes)
7. Need boating access along canal for small boats. (2 votes)
8. Coordinate signs/information with park development. (1 vote)
8. Develop environmental education materials, programs, etc. (1 vote)
9. Keep tourists in North Carolina. (0 votes)
9. Need signs to increase awareness. (0 votes)
9. Need information. (0 votes)
9. Reconsider bond fund expenditures and use some of land money for Dismal Swamp. (0 votes)
9. Look at road access for fire suppression purposes (US Fish & Wildlife Service). (0 votes)
9. Renew/extend agreement with US Fish & Wildlife Service. (0 votes)

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